AT&T

AT&T Business Communications Systems

subject: **Addendum 1 (555-025-101ADD) for DS1/DMI/ISDN-PRI Reference (555-025-101)**

date: **December 1990**

from: **AT&T**

The packet of addendum information enclosed with this cover memo includes any necessary replacement, supplement, and errata pages to *DS1/DMI/ISDN-PRI Reference.* It contains both new information and information from any previous addenda to the document. By incorporating the addendum as instructed on the next page, you can update your copy of the document to be current with the latest issue of the System 85 or DEFINITY® Generic 2.1 Communications System.

When you have incorporated the addendum, be sure to insert the addendum description into your document behind the title page, where it will serve as a record that the document has been addended.

ADDENDUM DESCRIPTION

This addendum includes necessary replacement, supplement, and errata pages to *DS1/DMI/ISDN-PRI Reference* (555-025-101), Issue 4, dated April, 1990. Incorporate the addendum as instructed below to update your copy of the document to be current with the latest issue of the System 85 or DEFINITY® Generic 2.1 Communications System. **Then insert this addendum description into the document, behind the title page and before the table of contents. It will serve as a record that your document has been addended.**

Nature of the Document Changes

The general nature of the changes to your document is as follows: This packet contains information about the following features:

- *Integrated Telemarketing Gateway Interface* (ITGI), *Integrated Telemarketing Gateway* (ITG), and *ISDN Advantage* including general descriptions on these unique applications of PRI trunks
- *Look-Ahead Interflow*, while currently documented on page 1-28, has expanded general descriptive information and additional administrative support information
- Appendix E, *Trunk Type and signaling Type Compatibility Tables* is a new group of trunk tables
- Miscellaneous cosmetic changes

Nature of the Addendum Pages

The addendum pages in this package may be of up to three types:

- Replacement pages contain new or changed information, indicated by margin rule marks | in text or hand symbols ☞ or ☜ in tables and figures. They are to replace existing pages in your document.
- Supplement pages contain all new information. They are to be added to your document.
- Errata pages contain lists or descriptions of corrections to be noted by hand in your document.

Instructions for Handling Addendum Pages

Instructions for handling the addendum pages are as follows:

Chapter	Type of Change	Pages Affected	Instructions
Table of Contents	Replacement	all pages	Remove all pages from document and discard; replace with new Table of Contents supplied.
About This Document	Replacement	all pages	Remove all pages from document and discard; replace with new About This Document supplied.
Chapter 1	Replacement	1-3 to 1-6	Remove pages 1-3 to 1-6 from document and discard; replace with those supplied.
Chapter 1	Errata	1-9	Make corrections by hand on page 1-9 of document. Add the following words to the end of the second paragraph in the *D-Channels* heading: Up to 479 B-Channels may be controlled by a single D-channel.
Chapter 1	Replacement	1-21 to 1-32	Remove pages 1-21 to 1-32 from document and discard; replace with pages 1-21 to 1-34 supplied.
Chapter 2	Replacement	2-1 to 2-2	Remove pages 2-1 to 2-2 from document and discard; replace with those supplied.
Chapter 2	Replacement	2-11 to 2-16	Remove pages 2-11 to 2-16 from document and discard; replace with those supplied.
Chapter 3	Replacement	all pages	Remove all pages from document and discard; replace new chapter supplied.
Chapter 5	Replacement	5-29 to 5-32	Remove pages 5-29 to 5-32 from document and discard; replace with those supplied.
Chapter 6	Replacement	6-1 to 6-8	Remove pages 6-1 to 6-8 from document and discard; replace with those supplied.

Chapter	Type of Change	Pages Affected	Instructions
Chapter 7	Replacement	all pages	Remove all pages from document and discard; replace new chapter supplied. (Retain and place sub-chapter tabs appropriately.)
Chapter 8	Replacement	8-7 to 8-8	Remove pages 8-7 to 8-8 from document and discard; replace with those supplied.
Appendix D	Replacement	all pages	Remove all pages from document and discard; replace with new appendix supplied.
Appendix E	Supplement	n/a	Add new appendix to document.
Index	Replacement	all pages	Remove all pages from document and discard; replace with new Index supplied.

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ABOUT THIS DOCUMENT

PURPOSE

Over the past several years, basic digital signal level 1 (DS1) service has evolved to include new capabilities and thereby support more sophisticated applications. The three prime applications are:

1. Digital multiplexed interface with bit-oriented signaling (DMI-BOS)
2. Digital multiplexed interface with message-oriented signaling (DMI-MOS)
3. Integrated Services Digital Network primary rate interface (ISDN-PRI)

Since these three applications merely build on each proceeding application, and extend basic DS1 service, they are covered in a single document. This document is reissued (as issue 4) to:

1. Include coverage for the 551V ST network channel-terminating equipment (NCTE) (also called the *channel service unit* or *CSU)*
2. Upgrade System 85 R2V4 administration procedures to include:
   - Coverage for issue 7 of the maintenance and administration panel (MAAP) flip charts
   - Additions and corrections to the administration procedures
   - Clarifications on the use of trunk type 120 (ISDN-dynamic) and other trunk types for providing Call-by-Call (CBC) Service Selection
3. Add coverage for DEFINITY® Communications System Generic 2 ISDN-PRI
4. Add coverage for System 75XE DS1/DMI
5. Add coverage for DEFINITY Communications System Generic 1 ISDN-PRI

This document describes System 75 and System 75XE DS1/DMIs as well as Generic 1 and Generic 2 ISDN-PRI. It introduces and defines the concepts and terminology that are unique to DS1/DMI/ISDN-PRI. Also included are descriptions of DS1/DMI/ISDN-PRI applications (for both private and public networks), engineering procedures and considerations, cabling and connection arrangements, and administration requirements, restrictions, and limitations.

INTENDED AUDIENCES

Since this document contains information ranging from the brief tutorial to the detailed requirements, it should prove useful to several groups of readers, including:

- Marketing personnel
- Technical consultants
- Network engineers
- Installation personnel
- System administrators
- Account teams
- Customers

PREREQUISITE SKILLS AND KNOWLEDGE

While there are no prerequisite skills assumed in this document, a basic understanding of telephony and networking is required. The *GLOSSARY* and *ABBREVIATIONS* appendixes of this document are provided to assist you in understanding the terminology used herein. See the *Related Sources* heading later in this preface, *About This Document,* for a list of other documents that discuss similar topics.

HOW THIS DOCUMENT IS ORGANIZED

This document consists of the following chapters:

1. INTRODUCTION — Provides a high-level functional description of the DS1/DMI/ISDN-PRI channels, available framing formats, signaling options, and line coding formats.
2. NETWORK CONNECTIONS AND CONFIGURATIONS — Describes functional connection arrangements to private network facilities (private endpoints) and to public network facilities (public endpoints). Included along with the public network discussions are Switched Access connections and services. This section also describes connection arrangements using digital multiplexer transmission equipment.
3. DS1 — TRANSMISSION AND CABLING — Describes cable distance limitations versus cable size, permitted cable types, the DSX-1 interface specification, the need and function of customer service units, on- and off-premises cable configurations, metallic and nonmetallic cable options, and equalizer and compensation settings.
4. THE DIGITAL LOSS PLAN — Describes transmission loss concepts, the analog and digital loss plans and the differences between them, and the user or installer impact (switch settings and administration values).
5. SYNCHRONIZATION OF DIGITAL FACILITIES — Describes synchronization strategies, objectives, and requirements. This chapter also discusses the availability of synchronization sources and includes the rules for selecting and assigning primary and secondary references and facilities.

6. PORT TYPES/INSTALLATION COMPATIBILITIES — Describe the DS1/DMI circuit pack operating modes, slot restrictions, and administration considerations and restrictions. This section also includes a table that lists the available port types and shows their compatibility on a system, release, version, and circuit-pack suffix basis.

7. ADMINISTRATION OPTIONS AND REQUIREMENTS — Covers the following information:

   — Describes those procedures that are required for DS1 services, what the available field encode options are, and the considerations for choosing the options for System 85

   — Describes those procedures that are required for DS1 services, what the available field encode options are, and the considerations for choosing the options for DEFINITY Generic 2

   — Describes the administration screens that are required for DS1 services, any unusual or special field requirements or considerations, and options for System 75 and System 75XE

   — Describes the administration screens that are required for DS1 services, any unusual or special field requirements or considerations, and options for Generic 1

8. MAINTENANCE AND ALARMS — Describes the diagnostic capabilities and alarms provided by DS1/DMI/ISDN-PRI. This part also provides information on methods of alarm analysis and alarm resolution.

- APPENDIXES

  A. ADMINISTRATION REQUIREMENTS — Provides screens showing administration field examples for System 75 (R1V2 and R1V3) special-access connections.

  B. SAMPLE INSTALLATION AND MAINTENANCE PROBLEMS — Describes, with examples, some of the more typical field problems, such as translation-based, synchronization-related, and physical-interface connection problems.

  C. ADMINISTRATIVE PROCEDURE SUMMARY — Describes the administrative procedures used on DEFINITY Generic 2 that relate to the ISDN-PRI, including how pertinent administrative fields relate to ISDN-PRI level 3 message contents and general feature operation.

  D. TRUNK TYPE AND SIGNALING TYPE COMPATIBILITY TABLES — Provides tables that define trunk type to signaling type compatibility for System 85 R2V1, R2V2, R2V3, R2V4, and Generic 2.

  E. TIE TRUNK SETTING — Provides administrative settings for tie trunks used with ISDN-PRI.

- ABBREVIATIONS
- GLOSSARY
- INDEX

NOTE: Although this document applies specifically to DS1/DMI and to ISDN-PRI, the Generic 2 Remote Group Interface (RGI) is also a DS1 application. As such, portions of chapter 1, *Introduction,* chapter 3, *DS1 Transmission and Cabling,* chapter 4, *The Digital Loss Plan,* and chapter 8, *Maintenance and Alarms,* may also apply in a general sense to the RGI. Specific information on the RGI is provided in documents on that subject.

HOW TO USE THIS DOCUMENT

How you will use this document will depend on several factors such as the amount of training you have received or your personal preferences for working with something new. You may want to read this document from cover to cover, use it merely as a reference when questions arise, or find that something in between these two extremes will best suit your needs. At the very least, you should make sure that you are familiar with how the document is organized and what it contains. This can be accomplished by reading this preface, *About this Document*, and then carefully scanning the document, taking special note of all headings.

The *Table of Contents* and the *Index* are provided for those times when you have problems finding information about a specific topic.

TRADEMARKS AND SERVICE MARKS

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- MS-DOS® is a registered trademark of Microsoft Corporation.
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RELATED SOURCES

The following documents may be referenced to obtain additional information on specific subjects.

DP2 Channel Service Unit User's Manual	999-100-189
AT&T DEFINITY® 75/85 Communications System Generic 1 Maintenance	555-204-105
AT&T DEFINITY® 75/85 Communications System Generic 1 and System 75 and System 75 XE Feature Description	555-200-201
AT&T DEFINITY® 75/85 Communications System Generic 2 Administration Procedures	555-104-506
AT&T DEFINITY® 75/85 Communications System Generic 2 Maintenance Procedures	555-104-117
AT&T DEFINITY® 75/85 Communications System Generic 2 Maintenance Repair Strategies	555-104-118
Network and Data Services Reference	555-025-201
AT&T System 85 Release 2 Version 4 Administration Procedures	555-103-506

BCM32000 — Description, Installation, and Maintenance — Digital Transmission Systems	365-287-100
Channel Division Multiplexer Installation and Maintenance Manual	365-165-101IS
Channel Expansion Multiplexer Installation and Maintenance Manual	365-160-101IS
D4-Channel Bank Channel Units — Application Engineering	855-351-105
DEFINITY® Communications System Generic 1.1 to 4ESS Via ISDN PRI Access	555-037-234
DEFINITY® Communication System Generic 2.1 to Generic 1.1 with DCS	555-037-238
DEFINITY® Communications System Generic 2.1 to 4ESS Via ISDN PRI Access	555-037-237
Digital Multiplexed Interface (DMI) Technical Specification Issue 3.2	555-025-204
ESF T1 Channel Service Unit User Manual	999-100-305
Integrated Services Digital Network (ISDN) Primary Rate Interface for AT&T Communications (Technical Publication 41459)	326-201
ISDN-BRI Reference Manual	555-025-102
Performance Quality Analysis	190-404-120
System 85 R2V4 to 4ESS Via ISDN PRI Access	555-037-232
System 85 R2V4 to DEFINITY® Communications System Generic 1.1 via ISDN PRI Access	555-037-233

HOW TO MAKE COMMENTS ABOUT THIS DOCUMENT

Reader comment cards are behind the table of contents of this document. While we have tried to make this document fit your needs, we are interested in your suggestions for improving it and urge you to complete and return a reader comment card.

If the reader comment cards have been removed from this document, please send your comments to:

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ISDN is a collection of international recommendations that are evolving toward adoption as a CCITT telecommunications standard. These recommendations are based on the following objectives:

1. To provide the user with end-to-end digital connectivity (which in theory will be independent of the network provider)
2. To use the end-to-end digital connections as shared (integrated) facilities, thus permitting the same channel to be used alternately for voice, data, or imagery/video
3. To permit users access to these new services by a limited set of multipurpose customer interfaces (each interface being CCITT approved)

The goal is to provide the full set of ISDN services and features on digital customer-premises switches, digital COs, and to provide these services end-to-end through the public digital network.

The CCITT ISDN recommendations define two functionally different types of communication interfaces known as the *ISDN primary rate interface (ISDN-PRI)* and the *ISDN basic rate interface (ISDN-BRI).* ISDN-PRI (23B + 1d) recommendations (like DS1) are associated with trunk access, while ISDN-BRI (2B + 1D) recommendations are associated with line (or user terminal) access.

Initially, the CCITT recommendations were identified by their standardization committee as the "I" series documents (I.412, I.431, I.441, and I.451). Later, another CCITT development committee used the I-series documents to develop another series of documents called the “Q” series (Q.921 or Q.931). Recommendations are designed to be compatible with the Open Systems Interconnection (OSI) 7-layer model. Both ISDN-PRI and ISDN-BRI include recommendations for layers 1, 2, and 3. Recommendations for the PRI are similar in function but not identical to those for the BRI. The BRI and the PRI are compared as follows.

Layer 1

PRI defines functions provided by the physical layer. It requires use of a DS1 and is based on recommendations I.211, I.412, and I.431. These layer 1 functions include the physical connector, the creation of the bit stream by multiplexing the information B-channels and signaling D-channel, the orderly sharing of the D-channel, timing, synchronization, framing, and line coding.

Layer 2

PRI defines the signaling-channel (data-link) protocol (that is, the envelope). This layer includes the LAPD protocol (the focus of the Q.921 recommendations). The LAPD protocol permits many logical links to be multiplexed into one D-channel. It also provides flow control and error recovery for each logical link.

Layer 3

PRI defines the network-layer protocol (that is, the message), which consists of the Q.931 recommendations. It provides the methods (messages) to establish, maintain, and terminate network connections between communicating ISDN applications. The message set includes over 200 messages, which provide many services/features that are not available without ISDN. Some of these include:

- Call establishment messages (alerting, call proceeding, connect, setup)
- Call information phase messages (resume, suspend)
- Call disestablishment messages (disconnect, release)
- Miscellaneous messages

The BRI terminates at a subscriber's residence or office. There, it connects either to an ISDN compatible terminal or to a conventional terminal via a terminal adapter. The BRI channel structure consists of a 2B + 1D format. Each B or bearer channel provides a 64K-bps information channel. Each D-channel provides a 16K-bps signaling channel.

NOTE: Specific descriptions for BRI layers 1, 2, and 3 are not included here. Another document that fully describes ISDN-BRI architecture, specific administration requirements, and service provisioning is being developed. (Refer to *ISDN-BRI Reference Manual* (555-025-102) for more information.)

When connecting customer-premises switches to the public network, consider the features and services supported on each end of the connection. At the time of this publication, the AT&T public network supported the following services:

- ACCUNET® Switched Digital Service
- MEGACOM®
- MEGACOM 800
- Call-by-call (CBC) Service Selection
- Automatic number identification (ANI)
- Software-Defined Network (SDN)

System 85 R2V4 and Generic 1 supports ISDN-PRI but not ISDN-BRI. However, System 85 R2V4 uses the line-side digital communications protocol (DCP) to provide end-to-end digital connectivity. The DCP channel structure consists of 2I + 1S channel format. Each I-channel provides a 64K-bps information (voice/data) channel, while the S-channel provides an 8K-bps signaling channel. The DCP is similar to ISDN-BRI, both in structure and in function. The DCP was AT&T's early attempt to offer (what at that time was) the evolving BRI standard. Figure 1-1, *System 85 R2V4 ISDN Configuration,* shows various trunk-side and line-side connections to a System 85 R2V4.

Generic 1 (R1V5) and Generic 2 provide a signaling method called *nonfacility-associated signaling* (NFAS). NFAS allows a D-channel on one PRI facility (sometimes called a *PRI pipe)* to provide signaling for B-channels on this same and other PRI pipes. On a point-to-point basis, all B-channels controlled by a D-channel (called a *signaling group* in Generic 1 and a *D-channel group* in Generic 2) must be administered in the same order so the sequence of channel IDs match (that is, the channel IDs of the terminating ISDN facility must match the channel IDs of the originating facility). For example, if two DS1s connect a Generic 1 to a Generic 2 and the Generic 1 lists B-channels 1-23 of the first facility followed by B-channels 1-11 of the second facility in a NFAS signaling group, the Generic 2 must also list in the same order B-channels 1-23 of the first facility followed by B-channels 1-11 of the second facility in its NFAS D-channel group.

Without administering NFAS for a trunk (B-channel), the Interface Identifier octet of the channel-ID IE may be omitted for calls made on that trunk. For example, if an ANN35 is not administered for NFAS, it is a 23B + 1D interface but no channel ID is sent on the D-channel messages for those trunks. If, however, this same interface is administered for NFAS and the D-channel controls the B-channels on the same board, it is still a 23B + 1D board but now the channel ID is sent.

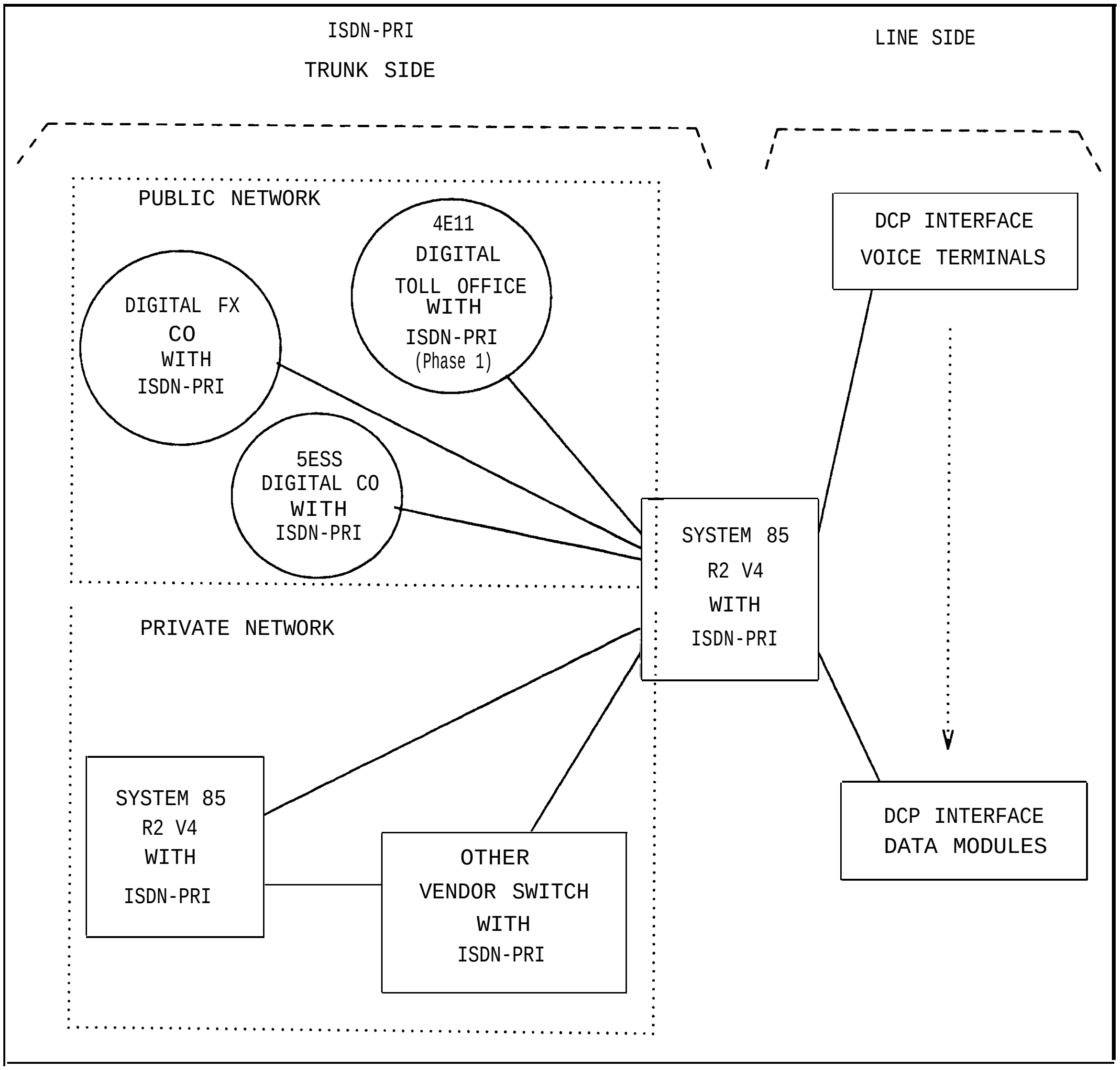


Figure 1-1. System 85 R2V4 ISDN Configuration

With NFAS, if two or more PRI pipes are present, an optional D-channel backup feature is available. One D-channel is administered as the primary D-channel on one DS1 and the secondary D-channel on another DS1. Only one D-channel per primary-secondary pair can be active at a time. If the primary D-channel fails, the signaling function is switched automatically to the secondary (sometimes called the *backup)* D-channel. Without D-channel backup, D-channel failure results in loss of service for all calls passing through a PRI pipe.

Generic 2 offers ISDN-BRI, however, some BRI capabilities are not initially available. Figure 1-2, *Generic* 2 *ISDN Network Configuration,* shows a Generic 2 switch in a sample network.

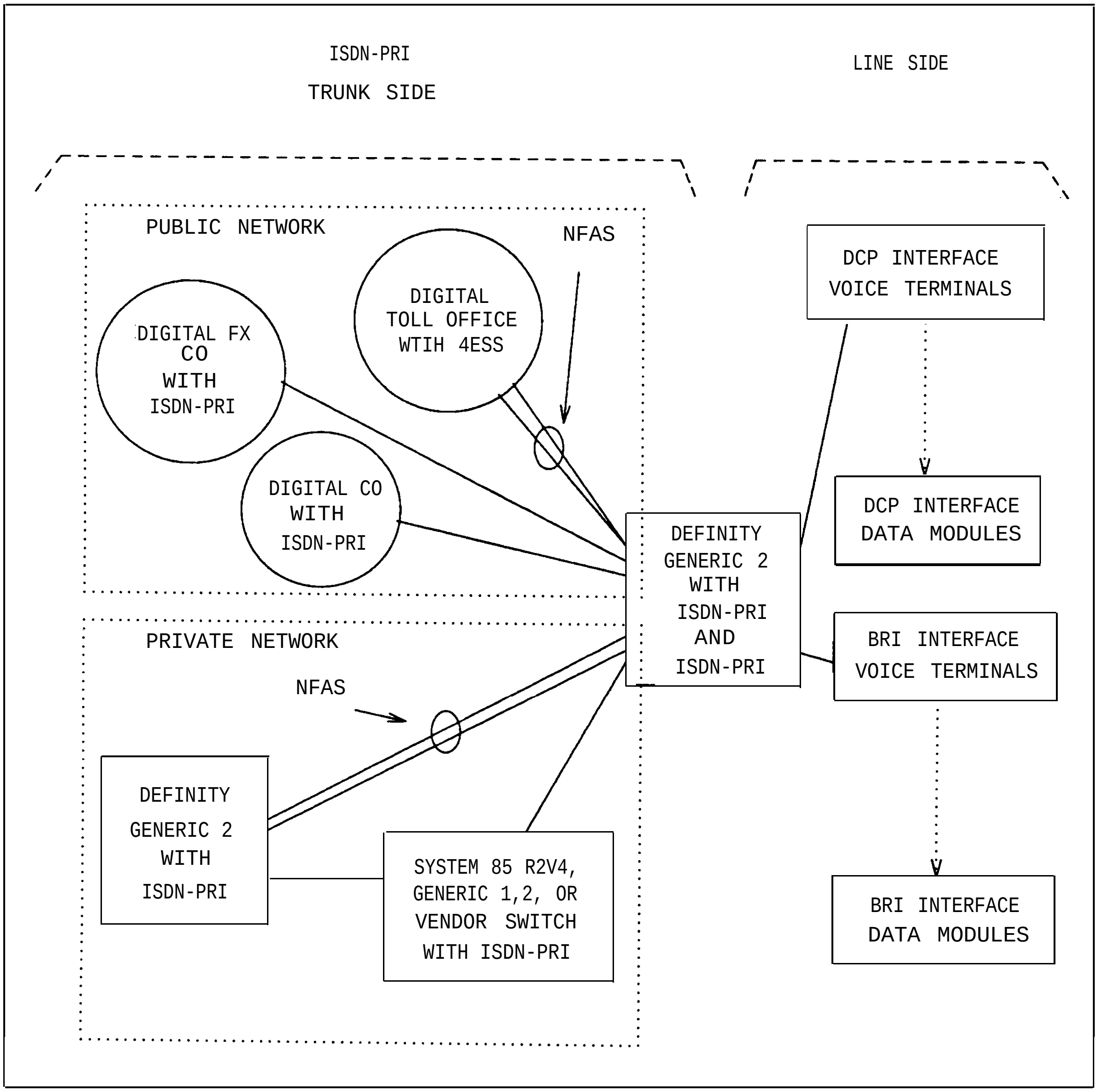


Figure 1-2. Generic 2 ISDN Network Configuration

Generic 1 and Generic 2 provide ISDN-PRI but do not support wideband channels. Additionally, ISDN-BRI is not currently supported in Generic 1. However, end-to-end digital connections are permitted via line-side DCP-interface voice terminals and DCP-interface data modules. Figure 1-3, *Generic 1 ISDN Network Configuration,* shows a Generic 1 in a sample network.

TABLE 1-2. Data Module Capabilities

Data Module	DMI Mode	User Data Rate	Sync/ Async	Bit Invert	Protocol Packaging	Handshake	Notes
7400 Series	2	to 19.2K	async	yes	HDLC	mode 2	
DTDM	2	to 19.2K	both	yes	HDLC	mode 2	
MPDM	0 1 2	64K 56K to 19.2K	sync sync both	yes no yes	no DDS HDLC	mode 2 mode 2 mode 2	1
MPDM/M1*	0 1 2	64K 56K to 19.2K	sync sync both	yes no yes	none DDS HDLC	no no no	2 2 2
3270 A	2 3	to 19.2K 64K	both sync	yes yes	HDLC LAPD/X.25	mode 3/2 adapt mode 3/2 adapt	3 4
3270 T	3	64K	sync	yes	LAPD/X.25	mode 3	4
PC/PBX Conn. w/ASCII Term Emul	2 3	to 19.2K 64K	async async	yes yes	HDLC LAPD/X.25	mode 3/2 adapt or mode 2 mode 3/2 adapt	5
PC/PBX Conn. w/3270 Emulation	3	64K	sync	yes	LAPD/X.25	mode 3	5
7500 Series BRI Sets	0 1 2 3 3/2	64K 56K to 19.2K 64K 64K	sync sync both sync sync	no no yes yes yes	none DDS HDLC LAPD/X.25 LAPD/X.25	no no mode 3/2 adapt mode 3/2 adapt mode 3/2 adapt	 6 7,8 7,8
PC/ISDN w/3270 Emulation	3	56K/64K	sync	yes/no option	LAPD/X.25	mode 3	9
PC/ISDN w/ASCII Terminal Emulation	2 3	to 19.2K 56K/64K	async sync	yes yes/no option	HDLC or mode 2 LAPD/X.25	mode 3/2 adapt mode 3	10 10
ISDN Advantage	3	64K	sync	yes	LAPD/X.25	mode 3	

MPDM — modular processor data module

NOTES:

1. A mode-2 handshake works only on 64K-bps facilities (such as alternate voice/data or AVD). (Use an MPDM/M1* for mode-1 calls made over robbed-bit facilities.) Since an ISDN-PRI link between a System 85 R2V4 and a Generic 1 uses these facilities, this handshaking will work.

2. You must use the MPDM/M1* when the far end data circuit-terminating equipment (DCE) is not another AT&T data module or robbed-bit facility (does not do a mode-2 handshake).

   Although the MPDM/M1* also suppresses the handshake in mode 2, it is recommended this not be done since rate adaption would not be possible.

3. "Mode 3/2 adaptive" means that a mode-3 handshake is attempted first. An algorithm is then followed to determine the far-end's mode and either switch to mode 2 or continue in mode 3.

4. Mode-3 data can only be circuit switched in Generic 1.1 and Generic 2.1. Using mode 3 on a 3270A or 3270T requires a 3270C on the far end.
5. Mode 2 on the PC/PBX Connection is supported under the ASCII terminal emulation package. The PC/PBX Connection in mode 2 uses a mode 3/2 adaptive handshake if the bit rate is set to 64K. If the rate is set to 19.2K or slower, a mode 2 handshake is used. 3270 emulation on the PC/PBX Connection requires a 3270C data module on the far end. Mode 3 operation is defined as synchronous when in 3270 emulation, otherwise mode 3 operation on the PC/PBX Connection is defined as asynchronous.
6. Mode 2 on the 7500 series is implemented in the incoming (to the 7500) direction only. Outgoing calls requiring mode 2 speeds use mode 3/2 adaptive BC.
7. On outgoing mode 3 and mode 3/2 adaptive calls, the 7500 series always inverts bits. On incoming mode 3 and mode 3/2 adaptive calls, the 7500 series checks the restriction bit in the low-layer compatibility IE and either inverts or does not invert depending on the contents of the IE. This is not done for mode 0 calls.
8. The algorithm used for the mode 3/2 handshake is different for DCP and the 7500 data modules. When called, the 7500 data module starts a mode 3 handshake. If it receives a mode 3 or mode 2 handshake from the calling end within a specified number of seconds, it switches to that mode. If it does not receive a mode 3 or mode 2 handshake within that time, it switches to mode 2. If it does not receive a mode 2 handshake within 15 more seconds, it drops the call.
9. Options exist on the PC/ISDN Platform with 3270 Emulation to allow the user to choose either 56K-bps or 64K-bps and to choose to invert or not invert bits. The PC/ISDN Platform with 3270 Emulation requires a 3270C data module on the far end.
10. Options exist on the PC/ISDN Platform with ASCII Terminal Emulation to allow the user to choose either 56K-bps or 64K-bps and to choose to invert or not invert bits. Either mode 3/2 adaptive or mode 2 handshakes are used depending on the baud rate option setting. If the setting is 19.2K-bps or slower, a mode 2 handshake is used. Mode 3 operation is defined as synchronous when in 3270 emulation, otherwise mode 3 operation on the PC/ISDN Platform is defined as asynchronous.

Some applications where DCP and DMI formatted data are not used include the following:

a. When 64K-bps data is transmitted across DS1/DMI/ISDN-PRI facilities (via a dedicated switch connection or DSC) to an endpoint such as a channel bank channel unit.

b. When a point-to-point data application is done with CDMs to drop and insert DS0 channels. Here, it is up to the user endpoints to ensure that the 1s-density requirement is met.

The method used to provide ACCUNET® switched digital service (used by D4-channel banks) also maintains the 1s-density requirement. This method uses only seven of the eight bits for each DS0 channel's 8-bit word to carry user data. The remaining bit (8) is "wired" to a 1. (MPDM/M1* is compatible with ACCUNET switched digital service).

IMPORTANT CONCEPTS

Important concepts discussed in this section include:

- Common-channel signaling
- Alternate voice/data (AVD) trunks
- Bearer capability (BC)
- ISDN call processing
- CBC Service Selection
- Networking restrictions and ISDN-PRI limitations

Common-Channel Signaling

Originally, common-channel signaling (CCS) meant that any of the 24 channels could be used to transmit signaling for the other 23. To offer CCS, both RBS and 24th-channel signaling would have to be disabled to make all 24 channels available to transmit signaling.

Current AT&T applications use only the 24th-channel as the signaling channel and, therefore, the term CCS has been used more and more as a synonym for 24th-channel signaling. Misuse of the term CCS and its original definition have contributed to some misunderstanding. When comparing System 75 and System 85 DS1/DMI administration procedures, you will find that:

a. The current definition of CCS is used when administering System 75 and Generic 1, although it is 24th-channel signaling that is actually being administered.

b. The original definition of CCS cannot be administered for System 85 or Generic 2, however, 24th-channel signaling can be administered. For Generic 2, the equivalent terms, 23B + 1D or 24th-channel signaling, are used rather than CCS.

Alternate Voice/Data (AVD) Trunks

AVD is an attribute of trunks used with System 85 R2V4 and earlier releases, and System 75 R1V3 and earlier releases, and all Generic 1 switches. For Generic 2, *bearer capability,* wich identifies the capabilities previously identified with AVD plus many more, is used instead.

AVD relates a trunk group’s translations to the type of signaling required to support the trunk group. From the software perspective (and when applicable), a trunk group is administered for either AVD or voice. Trunk groups administered for AVD may be used for both voice and digital data applications and require a DS1 that is administered for 24th-channel signaling.

Bearer Capability (BC)

System 85 R2V4 introduced the administration attribute known as *bearer capability* (BC). The primary function of BC is to specify the transport mode and the channel requirements (clear/restricted) needed for completing a data call. BC is used for determing compatibility when non-ISDN facilities are connected to ISDN facilities, including originated calls, terminated calls, and tandem connections. BC must be administered for all trunk groups, every extension's class-of-service (COS), and all Automatic Route Selection (ARS) routing-pattern preferences.

System 85 R2V4

For System 85 R2V4, there are the five different BC codes:

0 *Voice and voice-grade data* — should be administered for DCP voice extensions, analog lines, analog trunks, and data applications that use modems.

NOTE: Except for 56K-bps, the trunk attribute AVD indicates 24th-channel signaling and whether a modem pool must be inserted to complete the call.

1 *Mode-1 data* — with the 56K-bps option — should be administered for 56K-bps synchronous data applications. MPDM uses mode-2 handshake unless using MPDM/M1*.

NOTE: The appropriate data module must be installed and optioned for 56K-bps operation. This arrangement can be used to support the special format required to support ACCUNET switched digital service or 56K-bps basic service (if using MPDM/M1*).

2 *Mode-2 data* — for data modules and EIA data terminations that do not operate as packet-mode data and are optioned for the following data rates: low, 300, 1200, 2400, 4800, 9600, 19.2K-bps. When appropriate, end points that route to DS1/DMI/ISDN-PRI preferences should be administered for mode 2 data. Data modules invert the data and uses mode-2 handshaking.

3 *Mode-3 data* — end points should be administered for preferences that are used for packet mode data. DCP inverts the data and uses mode-3/2 handshaking. This is used for patterns associated with ISDN-BRI or PC-PBX.

4 *Mode-0 data* — end points should be administered for digital endpoints that are used to transmit 64K-bps data. *

Depending on the administered value, an originated call will either require an ISDN channel, have an administered preference that an ISDN channel be used, or have no requirement for what type of facility is used to complete the call. For terminated calls and tandem connections, the BC class (BCC) for both links must be compatible. For example, voice and voice-grade data are equivalent to the no requirement case since the call characteristics for all other types of facilities are satisfactory. In contrast, B-channels transmitting 64K-bps digital data require that the connected channel have the same call characteristics (the same BCC) such as where an ISDN channel is required. This information appears in the traveling class mark (TCM) IE (layer 3) codeset 7 in System 85 R2V4, and in codeset 6 in Generic 2.

Generic 1

For information about how BC is done for Generic 1, refer to the *AT&T DEFINITY 75/85 Communications System Generic 1 and System 75 and System 75 XE Feature Description* (555-200-201).

Generic 2

Generic 2 continues the bearer capability concept with *bearer capability class of service,* (BCCOS). BCCOS is a set of attributes that is assigned to extensions, AAR and ARS routing pattern preferences, and trunk groups (BCC is one of these attributes). BCCOS determines such actions as call routing and modem pooling insertion based on the calling and called parties BCCs and information types (that is, clear or restricted).

You can assign up to 256 BCCOSs (0-255), where codes 0 through 9 are predefined as:

0 *Voice only* — used for voice application extensions (such as DCP and ISDN-BRI extensions, analog lines, and analog trunks)

1 *Mode 2 data* — used for EIA data terminations, and DCP or BRI data modules that do not operate as packet mode data and are optioned for any of the following data rates: low, 300, 1200, 2400, 4800, 9600, or 19.2K-bps

2 *Mode 3/2 adaptive data* — used for data applications that can run both modes 3 and 2 (such as BRI, PC/PBX, and 3270 data modules). Mode 3 is tried first; if it fails, mode 2 is used.

3 *Unknown digital* — used for those calls of any mode (0-3) where the signaling message does not specify a mode (such as DS1 trunks using common-channel or 24th-channel signaling)

4 *Unkown analog* — used for voice or voice-grade data calls where the signaling message does not specify a type (such as analog trunks and robbed-bit DS1 trunks)

5 *Voice-grade data* — used for data applications that use modems

6 *Mode-0 data* — used for facilities that transmit 64K-bps data (DCP and BRI extensions, DMI-BOS trunks, and ISDN-PRI facilities).

7 *Mode-1 data* — used for 56K-bps synchronous data applications. The appropriate data module must be installed and optioned for 56K-bps operation.

> **NOTE:** This arrangement can be used to support the special format required for ACCUNET switched digital service or 56K-bps basic service. DCP uses a mode-2 handshake unless an MPDM/M1* data module is used.

8 *Mode-3 data* — should be administered for those applications requiring packet mode data.

9 *X.25* — X.25 is administered only for DCIU and other X.25 links.

Predefined BCCOSs should not be redefined. Lines, trunks, and AAR/ARS preferences are assigned the default BC when one is not administered. Generic 2 BCCOS defaults are intended to make a Generic 2 switch operate like a System 85 R2V4 (that is, Generic 2 will insert modem pool members and block calls.) Table 1-3, *Bearer Capability Class of Service*, lists the default values for common switch parameters.

TABLE 1-3. BCCOS

Switch Parameter	Default Value
Analog Lines	0
All trunks except Host Access	0
AAR/ARS Preferences	0
Host Access trunks	1
DCP data modules (both lines and trunks)	1
BRI extensions	0

NOTE: Extensions with multiple appearances must have the same BC administered for each appearance.

BCCOS is implemented by doing the following five steps:

1. *Define a BCCOS in procedure 014, word 1*

   Fields 2-16 of this procedure determine how the extension, preference, or trunk group assigned a BCCOS will treat calls made to that extension, preference, or trunk group. This treatment is based on the BC and information type fields of the BCCOS of the calling extension or trunk.

2. *Assign a BCCOS to extensions in procedure 000, word 3*

   Field 1 assigns a BCCOS to an extension number. This assignment affects the pattern or preference selected for this extension on outgoing calls (see step 4 below).

The 10 BCs are defined in field 16 of procedure 014, word 1. This definition codes the BC IE in the setup message when the extension (entered in field 1 of procedure 000, word 3) accesses an ISDN-PRI trunk for an outgoing call (DCP only).

3. *When a Generic 2 is connected to a 4ESS, assign a network-specific facility (NSF) in procedure 279, word 1*

   Each interexchange carrier (which provides public network ISDN service) must have a unique identifier number. Furthermore, each carrier may provide multiple ISDN services and ISDN features that must be individually identified via a Network Specific Facility (NSF) coding value. A NSF is an ISDN IE (sent in the setup message) that is used to identify the network or feature associated with the call. When connected to a 4ESS, a Generic 2 must send the appropriate NSF for MEGACOM, SDN, and ACCUNET switched digital service calls. (MEGACOM 800 service calls do not require an NSF since it is an incoming-only service and the Generic 2 cannot tandem it to another switch as a MEGACOM 800 call.)

4. *Assign AAR and ARS routing preferences in procedures 309, word 5, and 321, word 5*

   Assign the same NSF index from field 1 of procedure 279, word 1, in field 5 of both of these procedures.

   For procedure 309, word 5, the value entered in field 5 along with the value entered in field 12 of procedure 309, word 1, (the IXC/ISDN network identifier) determine the NSF IE for calls routed over this ARS plan, pattern, or preference. An NSF IE is not sent if a value is not entered. If field 5 has no value but an IXC/ISDN network identifier is specified, the network identification is specified with the transit network selection IE instead of the network-specific facilities IE.

   For procedure 321, word 5, the fields in this procedure define for AAR patterns and preferences what procedure 309, word 5, define for ARS plans, patterns, and preferences.

5. *Administer trunk groups in procedure 100, words 1-3*

   For procedure 100, word 1:

   Field 6 defines the trunk type of a specific trunk group. For ISDN trunk groups as well as other types of trunk groups, the entered type defines feature operation for the trunk group. For example, if a trunk group is assigned the type of 19, incoming calls over this trunk group are routed to the attendant console. On Direct Inward Dial (DID) trunk-type groups, the switch expects station-number digits on all incoming trunks; on tie-trunk-type groups, the switch can handle either station-number digits or network numbers.

   For an ISDN trunk group, a dynamic trunk type (120) can be assigned to the group. This trunk type allows the group to process calls with a different trunk type on a call-by-call (CBC) basis. For example, one incoming call over the group may expect station number digits (such as a MEGACOM call), while the next call over the group may expect a network number (such as a Software Defined Network call, also called a SDN call).

   The ISDN Dynamic trunk type allows administration of both an AAR/ARS prefix digit (procedure 103) and a DID additional digit (procedure 101). (This cannot be done for any other type of trunk group.)

For procedure 100, word 2:

Field 1 specifies the trunk group number and field 2 specifies a BCCOS number for this trunk group. For interworked tandem calls through the switch where the calling trunk is not ISDN-PRI trunk and the called trunk is, the BCCOS of the non-ISDN-PRI trunk is used to define a BC for the outgoing setup message over the ISDN-PRI trunk. This COS also defines other routing parameters.

For procedure 100, word 3:

Field 2 assigns a trunk group as ISDN-PRI that has ISDN-PRI signaling (type 20). This causes ISDN-PRI message-oriented signaling (MOS) to occur for the trunk group.

Field 8 prevents the sending of various IEs over the trunk group specified in field 1.

For specific information on routing rules, refer to appendix C: *Administrative Procedure Summary.*

For specific information on administering a Generic 2 to a 4ESS, see *DEFINITY Communications System Generic 2.1 to 4ESS Via ISDN PRI Access,* 555-037-237.

For specific information on proper implementation of BCCOS, refer to *DEFINITY® Communications System Generic 2 Administration Procedures,* 555-104-506.

ISDN Call Processing

ISDN-PRI is a trunk signaling type. ISDN trunk signaling is applied on a per-trunk-group basis and is compatible with most existing switch features. ISDN trunk signaling also supports many new networking features as described next.

Outgoing Calls

For outgoing calls, ISDN trunk groups may be categorized as those that:

1. Require that address digits be collected before trunk seizure (this can be done on non-ISDN trunks)
2. Seize the trunk and do not outpulse any digits (this is called *digit sending)*
3. Seize the trunk, obtain a start dial signal, and then begin digit outpulsing (this is called *cut-through dialing)* to the terminating switch

The ISDN protocol requires that all dialed digits be collected before trunk seizure so cut-through dialing cannot be provided for ISDN calls. Since few applications use digit sending, AAR or ARS software must be used to collect and process dialed digits. If the switch is properly administered and the numbering-plan data blocks are correct, AAR or ARS software processes dialed digits based on data within the routing pattern and routing preference combinations resulting in the selection of a particular service or feature. The routing pattern and routing preference combinations determine which outgoing trunk group is selected and whether ISDN-PRI trunk signaling is used.

Each call routed to an ISDN signaling trunk group generates a series of Q.931 messages over the D-channel. For example, the calling party IE of the ISDN-PRI setup message assembles the dialed digits as ASCII numbers that correspond to the defined numbering-plan format. Also included within the setup message are the BC requirements, B-channel identification, and network-specific facilities (NSF). If the requested facilities are not available, either channel negotiation is begun or, if appropriate, a cause failure code is returned and the call attempt is dropped. Otherwise, the called switch responds with a call proceeding or alerting message.

Incoming Calls

Incoming ISDN calls are generally processed similar to outgoing ISDN calls. Initially, the called switch receives a setup message over the D-channel and processes the contents of the setup message. The call states of the switch, how the particular trunk groups are administered, and decisions taken as a result of processing the setup message will determine exactly how the ISDN call is processed.

Look-Ahead Interflow

Look-Ahead Interflow allows customers with multiple ISDN-PRI locations to achieve optimum call-handling capability and agent productivity by routing calls among call centers as though they were one location. Look-Ahead Interflow is normally used with the Automatic Call Distribution (ACD), AAR/ARS, and Call Vectoring features to conditionally select a distant switch to handle interflowed calls. Which distant switch the sending switch selects is determined by a series of “route to” steps within the same vector. Look-Ahead Interflow then lets the sending switch use the D-channel to query the status of a distant switch before sending the call. If the distant switch can handle the interflow call, it accepts the call with a D-channel (progress) message and the call is sent over the B-channel. If the distant switch cannot handle the call, it rejects the call with a different (disconnect) message. The sending switch then either selects an alternative distant switch from subsequent “route to” steps and sets up another status query, or invokes the alternative action program within its own local vector.

Calls can be intelligently interflowed among switches based on (that is, progress of the message):

- Time of oldest call in the queue
- Number of calls in the queue
- Number of staff or available agents to handle calls
- Time of day

NOTE: Look-Ahead Interflow currently works only in private network configurations.

NOTE: Call Vectoring and AAR/ARS must be present for Look-Ahead Interflow to work properly.

Summary

ISDN calls are processed using conventional, well-established, time-proven call-processing techniques. The ISDN layer-3 software maintains status records for the ISDN call states, maintains the call-reference value (CRV) for each B-channel, and starts sending messages. To request services from the conventional call-processing routines, ISDN layer-3 software informs the switch of items such as incoming calls and dialed digits.

The ISDN-PRI level-3 messages are a collection of IEs that are defined in the Q.931 recommendations. Each message has at least one IE. IEs are transmitted and received over the D-channel. IEs contain three headers: protocol discriminator, call reference, and message type. Figure 1-9, *ISDN Message Signaling Format*, shows the message-signaling format.

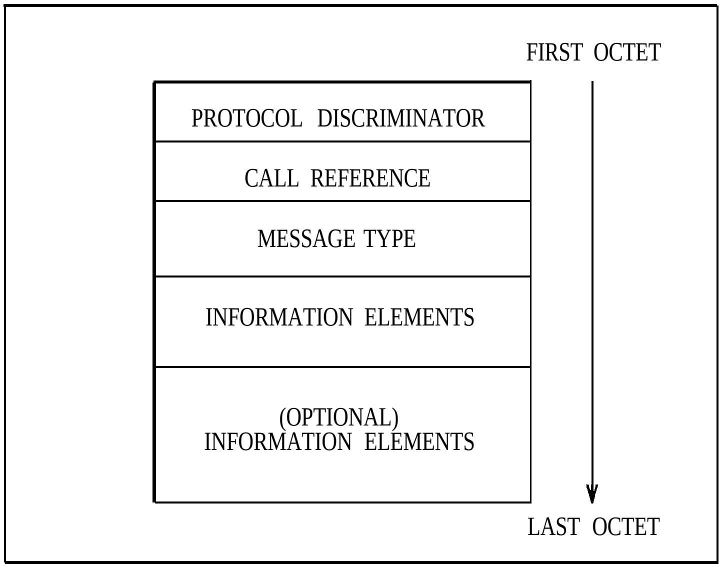


Figure 1-9. ISDN Message Signaling Format

IEs may be one or more octets long, depending on the element type. There are 133 different IE identifiers (called *codepoints)* grouped into eight functional categories (codesets 0 through 7).

How trunk groups are constructed and how ISDN-supported features are administered determines which B-channels may be selected to originate and terminate a particular call. Generally, any B-channel may be used with both originating and terminating calls so a particular channel may support a variety of applications and trunk types. In Generic 2, this capability is called *ISDN dynamic;* in Generic 1, it is called *call-by-call* (CBC). For both Generic 1 and Generic 2, this feature is called *CBC Service Selection.*

Administration software also allows services to be dedicated to specific channels by assigning a channel to a particular trunk type. In this way, the switch always provides enough trunks for a particular type of service. Channels administered for specific services are not available for ISDN-dynamic uses.

With CBC Service Selection, calls requesting various types of services are routed, on a call-by-call basis, over the same ISDN channels. To distinguish between various types of calls, the service type is specified as a part of the message. Also included are BCC and NSF IEs.

The NSF IE identifies the feature or service provided by the network carrier (such as MEGACOM service from AT&T). The called-party IE is used to specify routing digits such as the North American dialing plan or RNX.

Except for DCS, the originating and terminating switches do *channel negotiation* to select a channel that is compatible with both endpoints. Channel negotiation gives some control of the B-channel used for a call. If the originating endpoint chooses a B-channel that is unacceptable to the terminating endpoint (for example, planned use of the channel by the terminating endpoint), then the terminating endpoint can request a change in the channel to be used for that call.

Although Q.931 recommendations allow for an asymmetrical design (that is, a user-to-network protocol), most ISDN-PRI procedures on System 85 R2V4, Generic 1, and Generic 2 can be used symmetrically. These communications systems can be administered as either the user side or as the network side. When accessing a 4ESS switch, 5ESS® switch, or vendor-compatible toll-office or CO, the customer-premises switch must have a user-side interface. For ISDN-PRI links between two private network switches, one link must be administered for the user side and the other for the network side.

Differences between the user side and network side are primarily related to resolving occurrences of *glare*. Glare is a condition where both switches try to originate a call on the same channel simultaneously. The network side always gains control of the channel and the user side backs down (terminals are excused from certain protocol functions).

Linking dissimilar networks to provide end-to-end call or feature processing is called *interworking*. Calls from non-ISDN facilities (analog trunks and/or DMI-BOS trunks) may be connected to ISDN facilities to provide end-to-end tandemed connections. The switch provides the required signal conversions through *interworking routines.* The switch features and services that may be used depend on an extension's COS assignment and other administration options. *

Depending on other administration options, message-associated user-to-user information (MAUUI) or user-to-user information (UUI) may be transmitted from one user endpoint to the other. UUI transfer includes the display of such things as calling number and calling party name.

Equipment manufacturers interpret the ISDN-PRI protocol in different ways. As a result, equipment (and various equipment releases) use different approaches. Currently, one significant difference occurs in codesets 6 and 7. System 85 R2V4 transfers UUI via codeset 7. System 85 R2V4 transfers network specific information in codeset 7 according to the initial definition of ISDN. Generic 2 transfers network-specific information in codeset 6 leaving codeset 7 available for user-specific information.

NOTE: Codesets 1 through 5 are reserved for future standards expansion.

CBC Service Selection

CBC trunk groups eliminate the need for dedicating specific B-channels to a particular service. CBC Service Selection can dynamically select individual B-channels (from a group of B-channels) and allocate those B-channels to any of the subscribed services. The selected B-channel may function as a specific trunk type (for a specific service) during one call, then later the same B-channel may function as a different trunk type (for a different service) during another call. The primary advantages of CBC Service Selection include:

- More efficient and effective use of ISDN-PRI network access trunks
- More access trunks available for call routing (providing an improvement in the grade of service)
- Reduction (usually) in the number of access trunks needed to provide the required grade of service, because of the increase in efficiency

CBC Service Selection is a public network ISDN feature. The AT&T ISDN network provides CBC Service Selection for AT&T ISDN nodal services (such as MEGACOM service, MEGACOM 800 service, Software Defined Network (SDN), ACCUNET switched digital service, and switched digital international). To use CBC Service Selection, the customer-premises switch must manage access to these nodal services. System 85 R2V4, Generic 1, and Generic 2 all provide CBC service selection. Because of architectural differences, these communications systems provide different levels of implementation.

From the customer-premises switch perspective, a CBC trunk group may be designed to support incoming nodal services, outgoing nodal services, or both.

System 85 R2V4/Generic 2 — CBC Implementation

The following describes details of CBC on System 85 R2V4 and Generic 2:

1. With System 85, station identification number/automatic number identification (SID-ANI) can be requested on per trunk group basis but not from the network on a per call basis. Therefore, if the particular trunk group provides CBC service selection, then all calls, regardless of the particular nodal service, must provide SID-ANI.

   At service provisioning time, the customer will determine whether to subscribe to this network service. From the AT&T network perspective, this service is available in either of two formats:

   - SID-ANI provided on every call
   - SID-ANI provided on request, call by call

   Regardless of which format is selected, ANI or SID can be ordered exclusively, or the service can be ordered as ANI preferred but will accept SID.

2. Except for trunk type 120, Generic 2 does not use the NSF value for processing incoming calls. Incoming calls are routed based on the number of digits delivered and the format of those digits. These conditions (the number and format of the digits) may impose restraints on the use and administration of CBC Service Selection.

3. System 85 R2V4 introduced a new trunk type known as ISDN-dynamic. ISDN-dynamic trunk types can only be used with ISDN-PRI facilities. Most other trunk types may be used with ISDN-PRI as well as other facilities. ISDN-dynamic trunk types are useful where more than one trunk type is needed, only one trunk group is available, and provisional routing digits are inadequate for the current application.

4. Each AT&T ISDN-PRI nodal service (MEGACOM 800, SDN, ACCUNET switched digital service) may be provisioned to deliver from 0 to 7 digits.

Generic 1 — CBC Implementation

The following describes details of CBC on Generic 1:

1. The SID-ANI number can be received either per trunk group or per call
2. When receiving calls over a CBC trunk group, define the usage-allocation plans. These plans prevent a particular nodal service from monopolizing a trunk group or being deprived of the minimum number of trunks.
3. On Generic 1, the "service type" field on the trunk group form permits entries such as CBC, access, tie, and tandem. When CBC is administered, the call-processing software analyzes the NSF (for incoming calls) for called party number or length. The other entries do not analyze the NSF but permit CBC Service Selection.

Networking Restrictions and ISDN-PRI Limitations

ISDN-PRI has the following limitations:

1. ISDN-PRI facilities cannot be used to connect a main and a satellite (such as a main/satellite trunk). Therefore, it is recommended that AAR be used with ISDN-PRI trunks to provide private network facilities. *

   Even though main/satellite trunks cannot be used over ISDN-PRI facilities, the main/satellite feature may still exist on a switch that uses ISDN. For example, ISDN-PRI facilities may be used to access the public network using the ARS software while non-ISDN-PRI trunks (such as main/satellite trunks) may be used to connect subtending switches to the main switch. Calls may originate and terminate on the satellite or on the tandem through the main, and route onto the ISDN public network via ISDN-PRI trunks.

2. Centralized Attendant Service (CAS) uses a trunk type that does not use ISDN-PRI signaling. Therefore, CAS is unavailable with ISDN-PRI facilities.
3. Distributed communications system (DCS) network configurations are supported over ISDN-PRI facilities. However, a separate DCIU signaling link is required. This separate signaling link may be a B-channel that is used as a DSC or an analog facility.
4. ISDN-PRI and DCS are two separate networking services. If DCS is used over an ISDN-PRI trunk, in most cases the DCS display appears instead of the ISDN-PRI messages.

   With ISDN-PRI, the calling party information is sent to the called party and the called party information is returned to the calling party.

   When ISDN-PRI and DCS are found in the same network, certain features predominate based on the handling of the called number. Refer to *DEFINITY Communication System Generic 2.1 to Generic 1.1 with DCS* (555-037-238) for more information regarding this networking arrangement.

5. Interworking between ISDN-PRI and DCS is a complex issue that is beyond the scope of this document. However, for pure ISDN-PRI or combined ISDN-PRI/DCS networks, several new ISDN feature and service options are available. These include:

   - Call routing based on BC
   - End-to-end ISDN connectivity routing
   - BC passed on a call-by-call basis
   - User-to-user information transport
   - Locally provided tones
   - Controlled initialization of trunks to in-service at provisioning time
   - Two-way busy out of trunks
   - Digital demand transmission test

   With interworking, the following types of calls are possible:

   - Calls between non-ISDN endpoints and ISDN endpoints (BRI terminals)
   - Calls between non-ISDN trunks and ISDN trunks
   - Calls between non-ISDN trunks and ISDN endpoints
   - Calls between non-ISDN endpoints and ISDN trunks

   Part of this capability is the automatic insertion of conversion resources (modem pool) based on the bearer capability rather than trunk type (see also the codeset mapping description in the *Procedure 280 Word 1* heading of chapter 7, *Administration Options and Requirements).*

   NOTE: For Generic 2, AVD trunk characteristics no longer govern modem pool insertion.

   For Generic 1, AVD is used for non-ISDN trunks.

6. Generally, DCS networks may overlay on an electronic tandem network (ETN) or main/satellite network. For DCS call routing, ETNs use AAR to complete DCS calls while main/satellite networks use multidigit steering software to complete DCS calls. Therefore, if DCS trunks are provided over ISDN-PRI facilities, then the switch must be configured with AAR. (See item 1 of this list for more information.)

7. When Generic 2 connects to a System 85 R2V4 using ISDN-PRI facilities to provide DCS service, then the originating extension will not receive display updates as the call progresses (for example, to call coverage or is forwarded). The DCS leave word calling feature is only applicable for 4- or 5-digit extension numbers; it will not function with 7- or 10-digit public- or private-network numbers.

Full DCS feature transparency is provided between two or more Generic 2s interconnected with ISDN-PRI facilities. The supported voice terminal features include:

- Abbreviated dialing
- Alphanumeric display (DCS)
- Automatic callback
- Call coverage
- Call forwarding — all calls
- Call waiting — terminating
- Call waiting — conference
- Priority calls
- Distinctive ringing
- Leave word — calling (no AP)
- Leave word — call transfer

8. When ISDN-PRI facilities connect an ETN main to an ETN tandem, the main must do additional routing since cut-through operation is not permitted. Dialed digits must first be collected and then the setup message transmitted to the tandem.

Automatic Voice Networks (AUTOVON), tandem tie-trunk networks (TTTN), and Common-Control Switching Arrangement (CCSA) or Enhanced Private Switched Communications Service (EPSCS) networks that use E&M trunks cannot be served by ISDN-PRI trunks. DS1 facilities that use robbed-bit inband signaling will work. Generic 2.1 without universal modules will support AUTOVON service; Generic 2.1 Issue 3.0 with universal modules will also support AUTOVON service.

ANI (also known as the *calling number identifier* or CNI and as the *calling line ID* or CLID) is currently regulated on a state-by-state basis. When maintenance people are troubleshooting intrastate ANI-related problems, these regulations may or may not permit ANI to be passed.

2. NETWORK CONNECTIONS AND CONFIGURATIONS

This chapter provides a description of common connection arrangements with System 85 R2V4, DEFINITY® Communications System Generic 1 and Generic 2. These connections include private network, public network, and those made through digital signal level 1 (DS1) auxiliary equipment. Also included is a description of the services provided by each connection, any option restrictions, and relevant synchronization issues.

The equipment used for completing the end-to-end connection may include any of the options described in chapter 3, *DS1 Transmission and Cabling.* These options permit distances between endpoints of a few feet to thousands of miles. Detailed information, such as that required to install and administer a connection, is contained in chapter 6, *Port Types/Installation Compatibilities,* and chapter 7, *Administration Options and Requirments.* Common field problems relating to these connections are described in Appendix B, *Sample Installation and Maintenance Problems.* A complete description of synchronization is provided in chapter 5, *Synchronization of Digital Facilities,* and loss adjustments are described in chapter 4, *The Digital Loss Plan.*

NETWORK DIFFICULTIES

Two of the many difficulties that can exist on public and private networks are hyperactivity and glare. Before describing connection arrangements, the methods for dealing with these two difficulties is discussed.

Hyperactivity

When a DS1 facility generates an abnormally high stimulus rate originating from an individual source over a certain amount of time (such as rapid on-hook and off-hook conditions), it is said to be *hyperactive*. The call-processing software can not handle the flood of stimuli, resulting in dial-tone delays. Hyperactivity can be caused by bit errors on the facility, misoptioned equipment, or hardware failures. Severe or long-lasting hyperactivity can overload the communications system with more messages than it can processs. Without intervention and corrective action, this could result in degradation or even loss of service on the switch.

On Generic 2, special software handles hyperactivity by executing the following steps:

1. Detecting the presence of possible hyperactivity
2. Identifying a suspected source of hyperactivity
3. Examing the suspected source
4. Arresting the message flow from the suspected port, usually protecting the communications system from excessive stimuli

5. Counting the number of messages and comparing this to other trunks
6. Determining whether a channel is hyperactive
7. Maintenance busying out a virtual trunk group with hyperactive channels or returning cleared channels to normal service

For more information about troubleshooting hyperactivity, refer to *DEFINITY Communications System Generic 2 Maintenance Repair Strategies* (555-104-118).

Normal, though temporarily high, levels of ISDN-PRI D-channel signaling can sometimes create apparent hyperactivity. This happens most often with nonfacility-associated signaling (NFAS) when many B-channels are associated with a particular D-channel. This problem is handled similarly to that described above with the exception that hyperactive D-channels are removed from service (associated B-channels are busied out). Usually, but not always, this problem is transient and disappears before a yellow alarm is sent. If this is a chronic problem in a particular configuration, administration of the NFAS B-channel group can be an effective solution.

Another category of hyperactivity involves digital communications protocol (DCP) equipment. DCP hyperactivity is not directly relevant to DS1, digital multiplexed interface (DMI), or ISDN-PRI, and is not discussed in detail here. DCP hyperactivity and DS1 hyperactivity are handled similarly.

Glare

Glare is the simultaneous seizure of a two-way trunk by two communications systems, resulting in a standoff. Because of ISDN's inherent negotiation capabilities, glare handling on ISDN-PRI trunks is different from that for other trunks. When both sides of the trunk are seized at the same time and setup messages cross on the D-channel, two rules are used to decide which side "wins" (succeeds in making a call on that channel) and which side "loses" (backs off or moves to a different trunk).

The first rule is evaluated using a parameter indicated in the Channel-ID information element (IE), called the *preferred/exclusive* option. This option specifies that either the channel is the only one that can be used for this call, or that the call can be completed over a different channel, specified by the destination switch, if the indicated channel is busy. The full benefits of using the preferred option are only reached if both switches can negotiate. A System 85 or Generic 2, having full negotiation capabilities, always sends a preferred indication, with one exception.

NOTE: In a DCS environment negotiation is impossible, so the exclusive option is used.

The 4ESS, in ISDN Phase 2, always uses the preferred option. In terms of glare, if both calls are exclusive, or both calls are preferred, the second rule (described below) is used to decide which call wins. If one call is exclusive and the other preferred, the exclusive call wins the trunk.

The second rule is based on the translation field *Interface Type* in procedure 262, word 1, which is set to either *network* or *user.* This field always has opposite settings on either side of the PRI. When a System 85 R2V4 or Generic 2 is connected to the AT&T public network or a central office (CO), it is translated as user. Otherwise, such as when several switches are networked together, the choice of network or user is optional. When glare occurs and both calls are preferred or both are exclusive, the network side wins.

The assignment of CEM channels must be coordinated with the DS1/DMI-BOS channel assignments on the switch. This is necessary so that only voice and voice-grade data channels are compressed and so that digital data or 24th-signaling channels pass through uncompressed.

The CEM does not place any restriction on a DS1/DMI-BOS between the switch and the CEM. Therefore, this interface may use either D4 or ESF framing, 24th-channel or robbed-bit signaling, and either ZCS or B8ZS line coding. However, CEMs have the following considerations:

- The type of signaling used on the compressed DS1/DMI-BOS facility
- The selection of compressed and uncompressed channels
- The use of echo cancelers
- The use of a processor that allows remote administration and maintenance of the CEM

Only the first two options will be discussed here. The other options, along with additional specific information, may be obtained from *CEM: Description, Installation, and Maintenance* (365-287-100) and *BCM32000 Solitaire: Description, Installation, and Maintenance* (365-287-115).

Three types of mutually exclusive signaling are used with the compressed DS1 facility between the two CEMs. These signaling types are different from the signaling types used by DS1/DMI-BOS. The first type of signaling is *variable bit-robbed (VBR).* It is similar to RBS in that it is an inband type of signaling. The VBR type is sometimes also called RBS, even though it is a different type from that associated with DS1/DMI-BOS. When VBR signaling is used:

- VBR signaling is the default signaling type supplied with the basic CEM unit
- VBR signaling is the only signaling type that allows a DS1 facility to carry the maximum of 48 compressed voice or voice-grade data channels
- Tandem connections (over several DS1/DMI facilities) can significantly affect signal quality
- All uncompressed channels (that is, digital data channels and the 24th signaling channel) must be provided on the same DS1/DMI.

  NOTE: VBR signaling should not be used for out-of-band signaling applications or used when the compressed facility connects to a DACS.

The second signaling format is called *bundling*. It is similar to 24th-channel signaling in that compressed channels are grouped into "bundles" of 12; 11 carry voice or voice-grade data and the 12th (called a *delta channel)* carries signaling for the other 11. The important points associated with bundling signaling are as follows:

1. It is the recommended signaling type for most applications
2. Hardware in addition to that provided with the basic CEM unit must be ordered
3. The maximum number of compressed channels that a CEM accommodates is reduced to 44
4. It is the only signaling method that allows compressed DS1 channels to be cross-connected through a DACS

5. It is the only signaling type that permits uncompressed channels, from both DS1/DMI-BOSes, to be connected to the CEM. Bundling is required when both DS1/DMI-BOSes operate with 24th-channel signaling.
6. It is required when the CEM is used with a CDM

The third signaling format is called *DMI-46.* This format uses DMI-BOS over the 24th channel of the compressed facility, leaving 46 compressed channels available for voice. DMI-46 is usually selected only when the facilities to the switch use RBS signaling.

The method for selecting the channels that are to be compressed and the channels that are to pass through uncompressed depends on the type of signaling used. Both methods are described as follows.

If VBR signaling is used, the assignment of compressed and uncompressed channels on one of the two input DS1/DMI-BOS facilities is done using 12 front-panel switches. The assignment of the other input DS1/DMI-BOS facility is done by default by the CEM. If bundling is used, four templates are used to assign status to each of the four 12 compressed-channel bundles. There are 6 front-panel switches per bundle. These switches select 1 of 64 possible templates per bundle. The templates define the status (compressed or uncompressed) of each channel, the signaling format that is being used, and the channels that have signaling disabled.

Regarding alarms, the CEM provides six relay contact closures. They are used to indicate major alarm conditions. The contacts should be wired individually to the external alarm interface of the switch, or at the minimum should be connected in parallel to one external alarm input of the switch.

ISDN-PRI PRIVATE-NETWORK CONNECTIONS

Private-network connections only include connections to other customer-premises switches.

System 85 R2 to a System 85 R2V4, Generic 1, or Generic 2

These connections are the most frequently used private network configurations. Typically, digital tie trunks are used to connect the switches. However, other trunk types, such as ISDN-dynamic trunk type 120, may be used. These trunks may be used to transmit voice, voice-grade data, and digital data.

If the two switches are colocated, then there are no network facilities between the switches, and any combination of signaling, framing, and line coding may be used. Excluding the user/network option, all other options should be administered identically for both switches.

Whenever carrier facilities are used to connect the ISDN-PRI endpoints, the carrier facilities may place limitations (if there are any) on the permitted options. When two or more switches are connected, they must be synchronized; one switch must be chosen as the timing master, and the other must derive timing from the master. Chapter 5, *Synchronization of Digital Facilities,* describes synchronization procedures.

System 85 or Generic 2 ISDN-PRI to Another Vendor's Digital Switch

When a System 85 or Generic 2 ISDN-PRI connects to another vendor's customer-premises switch (another vendor's ISDN-PRI or equivalent), several items should be verified to ensure compatibility. These include the interface electrical characteristics, options, and synchronization capabilities. The following questions should be answered:

- Does the vendor product provide a DSX-1 interface?
- Does the vendor product support at least one each of the line coding, framing, and signaling options provided by System 85 or Generic 2?
- For synchronization purposes, what stratum clock does the vendor switch provide?
- Will the vendor switch act as a timing master or slave its timing to the System 85 or Generic 2?
- Does the vendor switch implement the digital loss plan specified by EIA/PIN-1429?
- Can the vendor switch be administered for either the user side or the network side as required?
- Is call-by-call (CBC) provided and what are the network service values (NSVs) for their services?
- For CBC, under what conditions are NSVs to be sent?
- For CBC, can NSVs be sent in the same dial-plan format as other incoming services?
- How are the messages and digit manipulation schemes implemented?
- How are the numbering plans implemented?

Depending on the answers to these questions, basic compatibility can be determined.

ISDN-PRI PUBLIC-NETWORK CONNECTIONS

Public network connections typically involve connecting a System 75, System 85, Generic 1, or Generic 2 to a 4ESS. Refer to *System 85 R2V4 to 4ESS Via ISDN PRI Access* (555-037-232), *DEFINITY Communications System Generic 1.1 to 4ESS Via ISDN PRI Access* (555-037-234), *DEFINITY Communications System Generic 2.1 to 4ESS Via ISDN PRI Access* (555-037-235) and Technical Publication 41459 *Integrated Services Digital Network (ISDN) Primary Rate Interface for AT&T Communications* (326-201) for more detailed information on these connections.

System 85 R2V4, Generic 1, and Generic 2 to a 4ESS

Connections to a 4ESS are called special-access connections. The physical connection is made from customer premises to a 4ESS. Toll calls go directly from the customer premises switch to the AT&T toll network. Network ISDN features and services are available through a 4ESS. The physical connection to a 4ESS toll switch is made (through the DIF frame) to a SM9 circuit pack.

Framing, Signaling, and Line Coding

A 4ESS does not place any restrictions on the framing, signaling, and line-coding options. Any applicable restrictions are related to the application and particular installation. *

Dial Tone

Second dial tone may be provided by a 4ESS. However, it is recommended that the customer-premises switch provide a second dial tone. With this arrangement, the second dial tone can be provided through use of the ARS feature on all ISDN-PRI trunks that terminate on a 4ESS.

Touch-Tone Capability

ISDN-PRI does not support either dial pulse addressing or touch-tone signaling, but provides the equivalent capabilities with ASCII character signaling on the D-channel.

Screening Intra-LATA Calls

A 4ESS can be used to block intra-LATA calls. However, all System 75, System 85, Generic 1, and Generic 2 special-access applications should use the ARS feature to screen outgoing calls. By using the ARS feature, only inter-LATA calls are routed to a 4ESS.

NFAS

Nonfacility-associated signaling is supported by a 4ESS. From a Generic 1 (R1V5) and Generic 2 perspective, there are no restrictions with this capability.

Backup D-Channel

The D-channel backup is supported by the 4ESS. From a Generic 1 (R1V5) and Generic 2 perspective, there are no restrictions with this capability.

Codeset

Both 4E11 and 4E12 receive and transmit UUI data in codeset 7.

4E13 receives and transmits UUI data in codeset 6. However, it will still tandem codeset-7 information.

User-to-User Information transfer

To pass user-to-user information (UUI) through the ISDN public network, all 4ESS-to-4ESS links must be implemented with CCS7. If as many as one link is implemented with CCS6, then UUI will not be passed.

Network Specific Facility

A network specific facility (NSF) is an ISDN IE, sent in the setup message, that identifies the network or feature associated with the call. For outgoing calls from the customer-premises side, the 4E11 and 4E12 will accept a NSF but do not require that one be present for static calls. When connected to a 4ESS, a System 85 R2V4, Generic 1, Generic 2 must send the appropriate NSF for MEGACOM, SDN, ACCUNET, and switched digital international calls.

> **NOTE:** For Generic 2, MEGACOM 800 service calls do not require an NSF since it is an incoming-only service which cannot be tandemed to another switch as a MEGACOM 800 call.

For call-by-call trunk groups, the 4ESS will check for a NSF and will reject the call if one is not present.

Synchronization

A 4ESS is always synchronized to the AT&T reference frequency. Therefore, for special-access applications, the System 85 or Generic 2 normally uses a 4ESS as the master-clock source. A particular ISDN-PRI facility may or may not be selected as the clock reference to the switch, depending on the use and reliability of other interfaces. The rules and considerations for selecting a synchronization source are detailed in chapter 5, *Synchronization of Digital Facilities.*

System 85 R2V4, Generic 1, or Generic 2 to a DACS

The DACS does not interpret DMI-MOS or ISDN-PRI and does not support those types of connections. However, D4, ESF, and RBS are supported and DACS will pass PRI.

System 85 or Generic 2 ISDN-PRI to a 5ESS

A 5ESS is most frequently used by a LEC. It provides digital CO services, both to subscribers and customer premises switches. For ISDN applications, a 5ESS must be equipped with 5e4.2 or later software.

A System 85 or Generic 2 ISDN-PRI connects to the extended digital subscriber line (EDSL) circuit pack in a 5ESS (only those configured with 5e4.2 Generic implement the network).

A 5ESS may or may not be synchronized to the AT&T reference frequency. A 5ESS has a lower stratum clock (higher accuracy) than a System 85 or Generic 2. Therefore, this issue should be verified for each specific configuration.

ISDN-PRI INTRA-SWITCH CONNECTIONS

ISDN-PIR links may also be used to connect certain AT&T features to the switch to enhance feature performance. The following products used ISDN-PRI trunks in this manner.

Generic 2 ISDN-PRI with the Integrated Telemarketing Gateway Interface

The Integrated Telemarketing Gateway Interface (ITGI) feature provides an interface between a Generic 2.1 (Issue 3.0) and an Integrated Telemarketing Gateway (ITG). ITG is a hardware and software package that provides a gateway between the switch and call-center software, enabling the call-center software to monitor and control certain incoming, outgoing, and internal calls. The ITG software resides on an AT&T 3B2 computer and the call-center software resides on a separate host computer. Since the call-center software is not part of the ITGI feature, the customer is responsible for obtaining and developing this software.

Compared to a telemarketing operation, a call-center operation has a broader scope. A telemarketing operation typically handles only incoming calls. A call-center operation handles high volumes of incoming and outgoing calls as well as call transfers and conferences.

Figure 2-1 shows an example of an ITGI configuration. The ITG is a 2-way gateway where information travels through the ITG from the switch to the call-center software, and from the call-center software to the switch. Each answering position, typically an ACD agent, has a voice terminal and a data terminal or a work station with voice and data capabilities.

Call Management Services

ITGI provides the following call management services:

- Incoming call management
- Outgoing call management
- Transfer and conference management

These call management services enhance agent call-handling capabilities and increase agent productivity in a call-center environment.

For incoming calls, the switch sends call information through the ITG to the call-center software. From this information, this software determines how to handle the call and what database information to retrieve for this particular caller. Call-handling information is sent through the ITG to the switch, which uses this information to route the incoming call to an available agent. Database information, such as a customer account record or a catalog order form, is automatically routed to this same agent so that it is instantly displayed as the agent takes the call.

Outgoing calls are handled in a similar way. By way of the ITG, the call-center software sends the switch instructions for placing a call and the switch sends the call-center software information about the call. Outgoing calls can be initiated by an agent (using a data terminal) or by the call-center software.

3. DS1 TRANSMISSION AND CABLING

Digital signal level 1 (DS1) is the specification for a particular digital signal format. DS1 interfaces should not be confused with T1 digital carriers. T1 is a specific transmission system. T1s are used to transmit digital signals of the DS1/DMI/ISDN-PRI format. This chapter describes the different methods of transmitting DS1 from one point to another.

A digital transmission network consists of the following four major parts:

- Terminals
- Multiplexers
- Cross-connects
- Transmission facilities

Terminals are the endpoints of the network. They generate and terminate digital signals. The DS1/DMI/ISDN-PRI, channel-division multiplexers (CDMs), and channel-expansion multiplexer (CEMs) are examples of terminal transmission equipment.

Digital multiplexers provide interfaces between the different bit rates in the digital network. The DS1 is the lowest level; the DS4 is the highest level. The DS4 contains 4032 64K-bps channels and has a line bit rate of 274.176M-bps. When a System 75 or System 85 DS1/DMI/ISDN-PRI signal is routed over facilities provided by a vendor such as AT&T, the signal may be multiplexed on and off higher-rate digital lines on the way to its final destination. Multiplexers may also be used on customer premises and in private networks.

Digital cross-connects are the interconnection points between the cable and the connector for terminals, multiplexers, and transmission facilities. Specifically, the DS1 cross-connect, called *DSX-1*, is used to interconnect DS1s. Several important concepts related to the DSX-1 are as follows:

- Connection to public-network DS1 facilities is made at a DSX-1 cross-connect. This cross-connect point (and usually the equipment used to terminate a DS1 facility) is the point of demarcation where customer-premises responsibility for equipment ends and the network provider's responsibility for equipment begins.
- The signal present at the DSX-1 cross-connect differs from the signal on the DS1 transmission facility in one important respect. The transmission facility carries DC power, which is used to power line repeaters and network channel-terminating equipment (NCTEs). The signal at the DSX-1 cannot carry DC power.
- There exists a maximum cable distance from the DS1 (or DS1 terminal equipment) to the DSX-1 cross-connect point (655 feet for 24-AWG cable). However, a cross-connect point is not always required. An example of when the cross-connect point is not required would be a continuous cable that directly connects two DS1s. For this case, it is recommended that a phantom point midway on the cable be selected as the cross-connect point. With this arrangement the maximum permitted distance between the two DS1s is twice the value specified to a DSX-1 cross connect.

Digital transmission facilities are used to transmit digital signals from one location to another. Many different digital transmission systems exist of which T1 is one. The type of facility used depends primarily on the distance between the endpoints, but other requirements may also affect facility selection. For example, an application may require nonmetallic facilities as opposed to metallic ones for reasons specific to that application. Examples of some of the DS1 transmission facilities available are T1 Outstate (T1/OS), FT3 Lightwave, and Microwave Digital Radio (DR-18 or DR-23). Details of these transmission systems are not provided here.

Several different interconnection options and considerations exist for a System 75, System 85, DEFINITY® Generic 1, and Generic 2 for DS1/DMI/SDN-PRI such as cable types, distance limitations, and switch settings that are unique to the particular unit of equipment. These options and considerations are described in the following sections.

METALLIC CABLING OPTIONS

Metallic cable is usually used to connect a DS1 to a DSX-1 cross-connect. Specific cable configurations depend on the application and if intervening transmission terminal equipment is in use.

DSX-1 Distance Limitations

The DSX-1 specification defines a particular pulse shape that guarantees an allowable power spectral density at the DSX-1 cross-connect point. By using the power requirements of this pulse shape and the known dB loss for the permitted cable types, a maximum cable distance (from a DS1 circuit pack to a DSX-1 cross-connect point) may be determined. For either building wiring or shielded cable (the two cable types approved for DS1/DMI/ISDN-PRI interconnections), maximum distance between the DS1/DMI/ISDN-PRI and a DSX-1 cross-connect point is 655 feet. If transmission terminal equipment not providing a DSX-1 is used, this maximum distance may be different. When applicable, refer to the installation manuals for the appropriate terminal equipment.

Network Channel Terminating Equipment (NCTE)

The Network Channel Terminating Equipment (NCTE), also called a *channel service unit* (CSU), is considered customer-premises equipment and is always required when connecting to network-provided metallic transmission facilities. NCTEs may also be required on some customer premises applications. For example, if the on-site distance between the two endpoints is such that office repeaters or line repeaters are required, then NCTEs or their equivalent must be used. NCTEs are generally not required when nonmetallic facilities such as fiber and microwave are used.

Features provided by most NCTEs include:

- Offering bipolar signaling, return-to-zero operation, balanced-to-ground design, zero DC component on signal outputs, DSX-1 between the customer's terminal equipment, and a 1.544M-bps digital data rate
- Monitoring of the input DS1 or, when necessary, adding pulses (1s) to ensure that the ones-density requirements are met

- Removing bipolar violations (which implies incompatibility with B8ZS line coding)
- Termination of a DS1 or regeneration of received data using an office repeater
- Provisions for supplying DC power to a DS1 to power line repeaters
- A fault-locating jack to aid in testing repeaters on DS1s
- Jacks for manually looping the NCTE and aiding in maintenance testing
- A DC-triggered remote (toward the far end) loopback relay

Other optional features include inband loopback control and the ability to pass bipolar violations. The most frequently used NCTEs are the 551V and the 551V ST. Other vendor-provided NCTEs may have distance limitations different from those for the 551V and 551V ST.

> **NOTE:** The 551V has a maximum transmit distance (toward a Generic 1 or Generic 2) of 85 feet. Therefore, when this type of NCTE (the 55lV) is used, the DS1 should be optioned or administered accordingly. The 551V ST has a maximum transmit distance (toward a Generic 1 or Generic 2) of 655 feet. Exact distance settings are usually determined at installation time and by configuring the NCTE's user-selectable option switches. Switch option selection must be coordinated with the particular switch DS1.

For most types of NCTEs the critical circuitry (such as, network protection and ones-density enforcement) are normally line-powered from the CO using a 60-mA current loop. If power from the CO is not available, then power must be provided locally. The type of power required (120 VAC or –48 VDC) generally depends on installation/engineering specifications and on the NCTE being used; refer to the installation and/or user’s manuals for the particular NCTE. The NCTE’s noncritical circuits (such as, error monitoring, alarming) are always powered locally.

The following six tables describe DIP-switch settings for ESF T1 Standalone and ESF T1 Multiline NTCEs. The DIP-switch settings apply to configurations shown in figure 3-1, *NCTE Framing Configurations.* The legend for tables 3-1 through 3-6 is given next.

> **NOTE:** If a switch is reset, you must power down the NCTE before the change will go into effect.

LEGEND

O	Open/Off/Up	**Dflt**	Factory Default
C	Closed/On/Down	**NA**	Not Used

TABLE 3-1. CSU #1 and Bit Error Rate Threshold Switch Settings

DIP-Switch Name	ESF T1 NCTE Standalone					ESF T1 NCTE Multiline				
	Switch Number	Dflt	ESF [1]	ESF /D4 [2]	D4 [3]	Switch Number	Dflt	ESF [1]	ESF /D4 [2]	D4 [3]
NCTE #1	SW1-1	O				SW5-1	C			
	SW1-2	C				SW5-2	C			
	SW1-3	C				SW5-3	C			
	SW1-4	C	SW1	is	Dflt	SW5-4	C			
	SW1-5	C				SW5-5	C	SW5	is	Dflt
	SW1-6	C				SW5-6	C			
	SW1-7	C				SW5-7	C			
	SW1-8	C				SW5-8	O			
Bit Error Rate Thresh	SW2-1	O				SW4-1	O			
	SW2-2	C	SW2	is	Dflt	SW4-2	C	SW4	is	Dflt
	SW2-3	O				SW4-3	O			
	SW2-4	O				SW4-4	O			
	SW2-5	O	NA	NA	NA	SW4-5	O	NA	NA	NA
	SW2-6	O	NA	NA	NA	SW4-6	O	NA	NA	NA
	SW2-7	O	NA	NA	NA	SW4-7	O	NA	NA	NA
	SW2-8	O				SW4-8	O			

NOTES:

1. ESF means ESF framing from end-to-end (see Configurations A and D in figure 3-1)
2. ESF/D4 means ESF framing over the span with D4 framing to the switch (see Configurations B and E in figure 3-1)
3. D4 means D4 framing from end-to-end (see Configurations C and F in figure 3-1)

TABLE 3-2. FS and ES Threshold Switch Settings

DIP-Switch Name	ESF T1 NCTE Standalone					ESF T1 NCTE Multiline				
	Switch Number	Dflt	ESF [1]	ESF /D4 [2]	D4 [3]	Switch Number	Dflt	ESF [1]	ESF /D4 [2]	D4 [3]
FS Thresh	SW3-1	O				SW3-1	O			
	SW3-2	O				SW3-2	O			
	SW3-3	O				SW3-3	O			
	SW3-4	O	SW3	is	NA	SW3-4	O	SW3	is	NA
	SW3-5	O				SW3-5	O			
	SW3-6	O				SW3-6	O			
	SW3-7	O				SW3-7	O			
	SW3-8	O				SW3-8	O			
ES Thresh	SW4-1	C	NA	NA	NA	SW2-1	O			
	SW4-2	C	NA	NA	NA	SW2-2	O			
	SW4-3	C	NA	NA	NA	SW2-3	O			
	SW4-4	C	NA	NA	NA	SW2-4	O	SW2	is	NA
	SW4-5	C	NA	NA	NA	SW2-5	O			
	SW4-6	C	NA	NA	NA	SW2-6	O			
	SW4-7	C	O	O	O	SW2-7	O			
	SW4-8	C	C	C	C	SW2-8	O			

NOTES:

1. ESF means ESF framing from end-to-end (see Configurations A and D in figure 3-1)
2. ESF/D4 means ESF framing over the span with D4 framing to the switch (see Configurations B and E in figure 3-1)
3. D4 means D4 framing from end-to-end (see Configurations C and F in figure 3-1)

TABLE 3-3. Configuration A and B Switch Settings

DIP-Switch Name	ESF T1 NCTE Standalone					ESF T1 NCTE Multiline				
	Switch Number	Dflt	ESF[1]	ESF /D4[2]	D4[3]	Switch Number	Dflt	ESF[1]	ESF /D4[2]	D4[3]
Config B	SW5-1	C[4]	O	C	C	SW1-1	O	NA	NA	NA
	SW5-2	C[5]	C	C	C	SW1-2	O	O	O	O
	SW5-3	C	C	C	C	SW1-3	O	O	O	O
	SW5-4	O	C	O	O	SW1-4	O	C	O	O
	SW5-5	O	C	O	O	SW1-5	O[6]	C	O	O
	SW5-6	O	O	O	O	SW1-6	C[7]	C	C	C
	SW5-7	O	O	O	O	SW1-7	C	C	C	C
	SW5-8	O	NA	NA	NA	SW1-8	C	O	C	C
Config A	SW6-1	C[8][5]	O	O	O	SW7-1	O[9][6]	O	O	O
	SW6-2	O[4]	O	O	O	SW7-2	O[7]	O	O	O
	SW6-3	O	O	O	O	SW7-3	O	O	O	O
	SW6-4	C	C	C	C	SW7-4	C	C	C	C
	SW6-5	C	C	C	C	SW7-5	C	C	C	C
	SW6-6	O	NA	NA	NA	SW7-6	O	NA	NA	NA
	SW6-7	O[8]	NA	NA	NA	SW7-7	O[9]	NA	NA	NA
	SW6-8	C	C	C	C	SW7-8	O	O	O	O

NOTES:

1. ESF means ESF framing from end-to-end (see Configurations A and D in figure 3-1)
2. ESF/D4 means ESF framing over the span with D4 framing to the switch (see Configurations B and E in figure 3-1)
3. D4 means D4 framing from end-to-end (see Configurations C and F in figure 3-1)
4. If the span uses ZCS (AMI) line coding, then SW5-2 = C and SW6-3 = O
   If the span uses B8ZS line coding, then SW5-2 = O and SW6-3 = C
5. If the switch uses ZCS (AMI) line coding, then SW5-3 = C and SW6-2 = O
   If the switch uses B8ZS line coding, then SW5-3 = O and SW6-2 = C
6. If the span uses ZCS (AMI) line coding, then SW1-7 = C and SW7-3 = O
   If the span uses B8ZS line coding, then SW1-7 = O and SW7-3 = C
7. If the far-end of the span is a 4ESS, then SW6-1 = C and SW6-8 = O
   If far-end of the span is a switch, then SW6-1 = O and SW6-8 = C
8. If the far-end of of the span is a 4ESS, then SW7-1 = C and SW7-8 = C
   If far-end of the span is a switch, then SW7-1 = O and SW7-8 = O

TABLE 3-4. Equalizer Switch Settings

DIP-Switch Name	ESF T1 NCTE Standalone					ESF T1 NCTE Multiline				
	Switch Number	Dflt	0’ to 150’	151’ to 450’	451’ to 655’	Switch Number	Dflt	0’ to 285 ’	286’ to 500’	501’ to 655’
Equa-lizer	SW7-1	C	C	O	O	SW6-1	O	NA	NA	NA
	SW7-2	O	O	C	O	SW6-2	O	O	O	O
	SW7-3	O	O	O	O	SW6-3	O	O	O	O
	SW7-4	O	O	C	O	SW6-4	O	C	O	O
	SW7-5	O	O	O	C	SW6-5	O	C	O	O
	SW7-6	O	O	C	O	SW6-6	C	C	C	C
	SW7-7	O	O	O	C	SW6-7	C	C	C	C
	SW7-8	O	O	O	NA	SW6-8	C	O	C	C

NOTE: The distance should be measured when the NCTE is not adjacent to the switch.

TABLE 3-5. PWR Switch Settings

DIP-Switch Name	ESF T1 NCTE Standalone					ESF T1 NCTE Multiline				
	Switch Number	Dflt	Pos. #1	Pos. #2	Pos. #3	Switch Number	Dflt	Pos. #1	Pos. #2	Pos. #3
PWR	S1	DL	DL local power WET	WL local power DRY	SP SPAN power	S1	DL	DL local power WET	WL local power DRY	SP SPAN power

NOTE: Local exchange companies (LECs) are currently installing Smart jacks requiring the use of a 0dB line build-out network (LBO).

TABLE 3-6. XMT (LBO) Switch Settings

DIP-Switch Name	ESF T1 NCTE Standalone					ESF T1 NCTE Multiline				
	Switch Number	Dflt	Pos. #1	Pos. #2	Pos. #3	Switch Number	Dflt	Pos. #1	Pos. #2	Pos. #3
XMT (LBO)	S2	0dB	0dB	7.5dB	15dB	S2	7.5dB	0dB	7.5dB	15dB

NOTE: LECs are currently installing Smart jacks which require the use of a 0dB LBO.

CONFIG-URATION		SWITCH FRAMING			SPAN FRAMING			SWITCH FRAMING		
A	GENERIC 1 ←	ESF	→ NCTE ←		ESF		→ NCTE ←	ESF	→ GENERIC 1	
B	GENERIC 1 ←	D4	→ NCTE ←		ESF		→ NCTE ←	D4	→ GENERIC 1	
C	GENERIC 1 ←	D4	→ NCTE ←		D4		→ NCTE ←	D4	→ GENERIC 1	
D	GENERIC 1 ←	ESF	→ NCTE ←		ESF		→ NCTE ←	ESF	→ SYSTEM 85	
E	GENERIC 1 ←	D4	→ NCTE ←		ESF		→ NCTE ←	D4	→ SYSTEM 85	
F	GENERIC 1 ←	D4	→ NCTE ←		D4		→ NCTE ←	D4	→ SYSTEM 85	

Figure 3-1. NCTE Framing Configurations

On-Premises Cabling

When both endpoints are in the same building, cabling has three distance ranges and the required equipment depends on the range. It is assumed that all cabling remains inside and is not exposed to foreign potentials such as lightning and needs no appropriate protection. Since all equipment is on customer premises, the customer is responsible for maintaining the equipment. Figure 3-2, *On-Premises Metallic-Cable Configurations,* shows the various possible on-premises metallic cabling configurations.

Direct — Under 1310 Feet

If two DS1s are separated by no more than 1310 feet (or no more than 655 feet to the same DSX-1 cross-connect point), then they may be connected directly without the need of additional equipment. The cross-connect point is generally not required and the connection may consist of a single continuous 1310 foot cable. Figure 3-2-A, *On-Premises Metallic-Cable Configurations,* shows this configuration.

Because ANN11Ds, ANN11Es, TN722Bs, and TN767s contain components that suppress unwanted emissions from a DS1, standard premises distribution system (PDS) cables may be used to interconnect these interfaces. The PDS wiring may only be used when connecting directly between System 75 and System 85 DS1s. Other equipment is not guaranteed to meet FCC emission requirements when used with unshielded cable. Allowable PDS cables include the following cable types or their electrical equivalents:

- All 24-gauge PDS cable
- 26-gauge PDS cable of types ARTM, BKTA, or AFTW

> **NOTE:** A 26-gauge cable has different distance limitations from 24-gauge cable. ANN11Cs do not contain components that suppress unwanted emissions. Therefore, when an ANN11C is used (either at one or both ends of a connection), PDS cables cannot be used. Shielded twisted-pair cable (DCC-5/24-TSA) is required.

Between 1310 and 4310 Feet

When the distance between DS1s exceeds 1310 feet, repeaters are required to regenerate the signal. If the total distance is less than 4310 feet, NCTEs containing office repeaters may be used at each end of a DS1 facility as shown in figure 3-2-B, *On-Premises Metallic-Cable Configurations*. Generally, the repeater module is ordered separately from the NCTE. The repeater module circuit is then installed within the NCTE housing as a part of the installation process.

Office repeaters *only* regenerate signals that are received from the transmission line span. NCTEs must be within 655 feet of their respective DS1 or the distance between the NCTEs should not exceed 3000 feet. Using NCTEs and office repeaters permits a total maximum distance of 4310 feet. NCTEs must be powered by a DS1 line or an external DC power source. Each NCTE connects to its respective DS1, DMI, or ISDN-PRI via a 15-pin D-connector on the rear of the NCTE.

> **NOTE:** PDS cabling should not be used for connecting to or between NCTEs. For equipment cabinet to NCTE connections, use DCC-5/24-TSA cables with appropriate connectors (such as ED1E434-11, group 181, group 370, group 380, the combination of group 380 and group 506 when connecting to a universal module, or H600 when connecting to a TN767) and applicable length.

Greater Than 4310 Feet

When distance between DS1s is greater than 4310 feet, line repeaters are required. Line repeaters regenerate the signal for both the receive and transmit directions. NCTEs and their associated DC power supplies (if necessary) are also required for this configuration. NCTEs are used to provide power to the line repeaters over the line.

Line repeaters may be placed up to 3000 feet from the NCTEs, and line repeaters may be spaced up to 6000 feet apart. NCTEs must still be within 655 feet of their respective DS1s. When using two line repeaters, DS1s can be up to 13,310 feet apart. This distance may be extended in increments of 6000 feet by using additional line repeaters. Figure 3-2-C, *On-Premises Metallic-Cable Configurations*, shows this configuration.

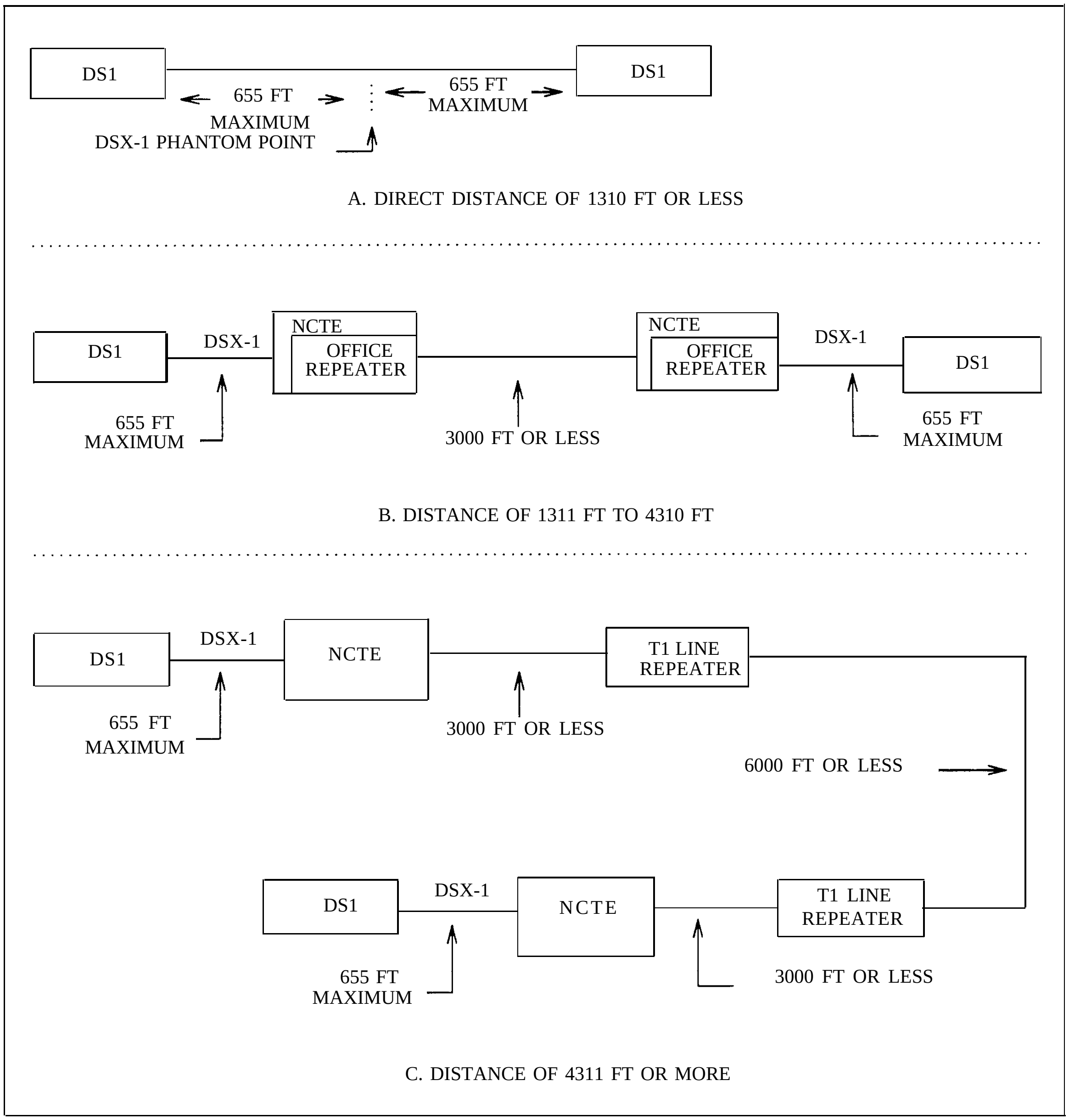


Figure 3-2. On-Premises Metallic-Cable Configurations

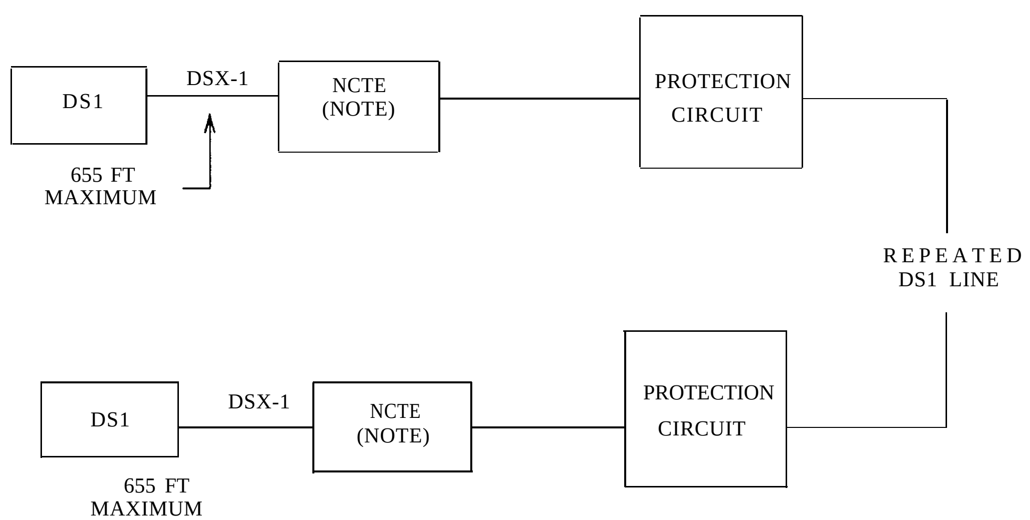
Off-Premises Cabling

When DS1s reside in different locations, they are typically connected via a transmission facility (such as a metallic cable configuration) that is leased from the LEC. This facility usually consists of a line and T1 repeater combination. The customer premises equipment interfaces to a DS1 network facility (T1 line) via NCTEs.

The customer is responsibility for maintaining NCTEs. When purchasing service from the LEC, the customer must specify the DS1-framing and line-coding requirements.

For off-premises cabling, it is also possible to use any of the connection methods described for "On-Premises Cabling" as long as appropriate lightning and powerline cross-protection is provided.

Echo on voice channels must also be considered when a DS1 facility extends over long distances (that is, long round trip delays are encountered). Round trip delays of about 16-ms equate to about 100 miles through the public switched network or 800 miles in a private network. Each digital switch and each digital multiplexer in a path adds about 3-ms and 2-ms of delay respectively. Therefore, private network routes with several digital switches and digital multiplexers may need to use echo cancelers in path distances of less than 100 miles as shown in figure 3-3, *On-Premises Metallic-Cable Configurations*. For a fee, AT&T Toll Offices can add echo cancelers.



NOTE: Use of the office repeater is optional depending on the distance to the first T1 repeater (unless it is needed to supply loop power).

Figure 3-3. Off-Premises Metallic Cable Configuration

NONMETALLIC CABLING OPTIONS

Many alternatives to DS1 metallic transmission facilities exist. Some of these include systems that transmit a DS1 signal on light-guide fiber, microwaves, infrared, and radio waves. All AT&T network distribution systems (NDS) products are compatible. Other systems should be compatible with System 75 and System 85 DS1s as long as the following conditions are met:

- The transmission system connects to a DS1 via a DSX-1 cross-connect
- The transmission system meets any special requirements for the application (for example, the transmission of bipolar violations if B8ZS line coding must be used)

Figure 3-4, *Nonmetallic Cabling Configurations,* shows nonmetallic cabling transmission systems.

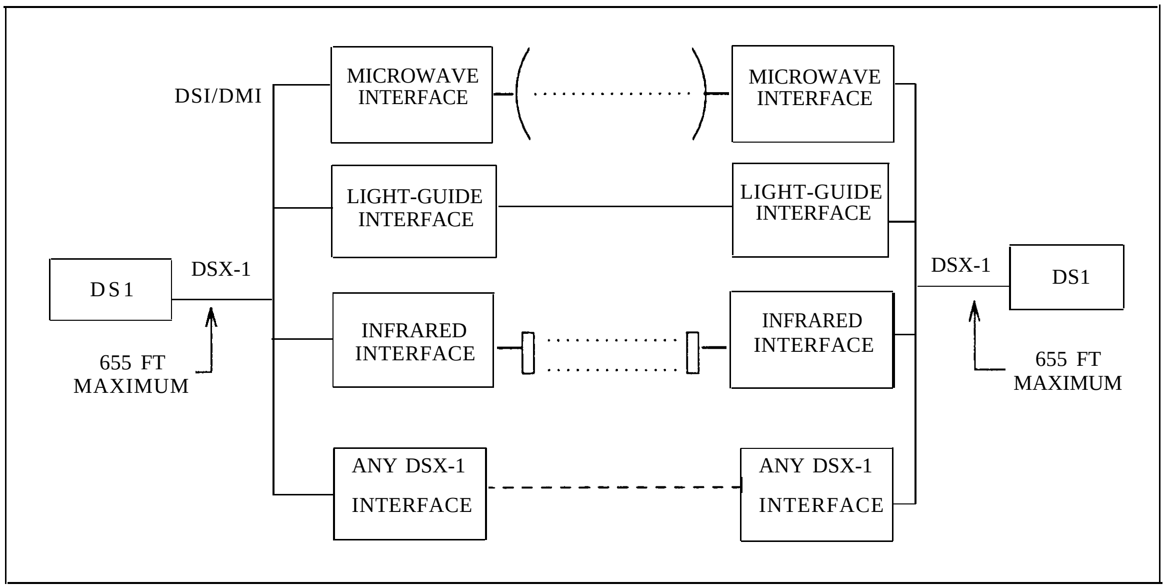
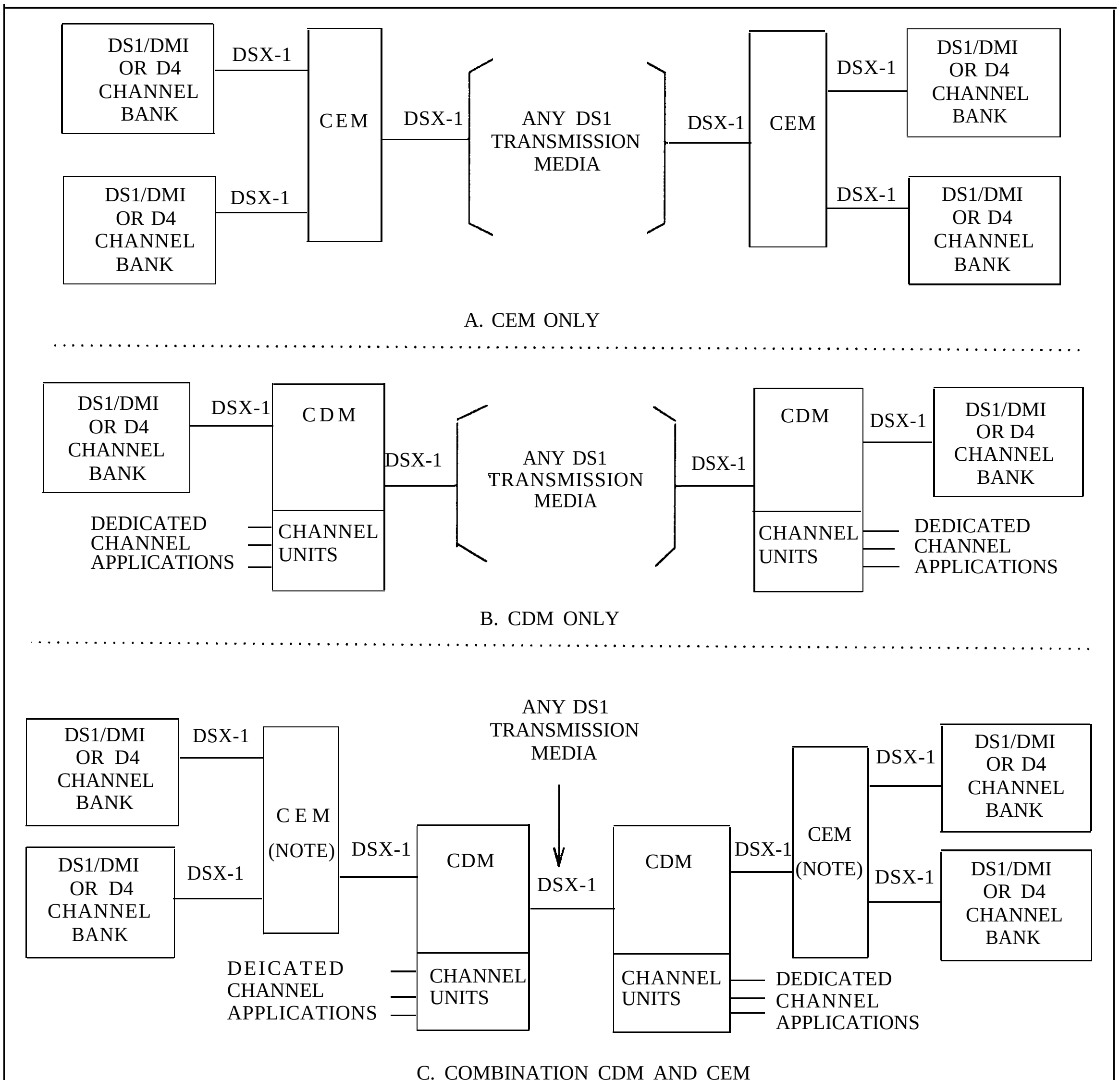


Figure 3-4. Nonmetallic Cabling Configurations

CEM AND CDM CABLING CONFIGURATIONS

Both the CEM and CDM provide a DSX-1 cross-connect to the DS1/DMI-BOS and therefore connect directly to a DS1/DMI-BOS. Any of the previously described metallic or nonmetallic transmission media may be used for completing the connection from a DS1/DMI-BOS to CEMs and CDMs. Figure 3-5, *CEM and CDM Cable Configurations*, shows stand alone and combined CEM and CDM configurations.

Refer to *Service Manual — Installation and Maintenance — Channel Division Multiplexer* (365-165-101) and to *BCM32000 — Description, Installation, and Maintenance — Digital Transmission Systems* (365-287-100) for appropriate distance limitations and switch settings.



NOTE: Requires the bundling signal option.

Figure 3-5. CEM and CDM Cable Configurations

LINE EQUALIZER AND COMPENSATION SETTINGS

The Generic 1 and Generic 2 DS1 circuit packs generate a signal that is preequalized. Preequalized means that the bipolar signal is shaped so that when it reaches the cable end it conforms to the DSX-1 power specification.

System 85 Traditional Modules

Traditional modules may be equipped with the ANN11 and ANN35 circuit packs. Preequalization is provided by properly setting the three equalizer switches, on the circuit packs. The three switches must be set for either half or all of the distance to the far end. The correct equalizer and compensation setting is determined based on the cable configuration. If a DS1 terminates at a NCTE or DSX-1 cross-connect, the total distance to the NCTE or DSX-1 should be used. If a DS1 terminates on another DS1, then half the distance to the other interface should be used. This setting is done in increments of about 133 feet [see table 3-7, *System85 Traditional Module Equalizer Settings (Metallic Cable)]*.

TABLE 3-7. *System 85 Traditional Module Equalizer Settings (Metallic Cable)*

Distance to Midpoint or Endpoint (FT)		ANN11, ANN35 Switch Settings		
22 AWG ABAM & 24 AWG PDS	**26 AWG PDS**	**1**	**2**	**3**
0 to 133	0 to 90	ON	ON	OFF
133 to 266	90 to 180	ON	OFF	ON
266 to 399	180 to 270	ON	OFF	OFF
399 to 532	270 to 360	OFF	ON	ON
532 to 665	360 to 450	OFF	ON	OFF

NOTE: The ANN11 and ANN35 circuit packs only have three switches.
Off (1) is away from the switch number; on (0) is toward the switch number.

Generic 1 and Generic 2 Universal Modules

For TN722_ and TN767 circuit packs, preequalization is provided by properly administering the line compensation field. Compensation adjustments are described in the appropriate Generic 1 and Generic 2 administration manuals.

Pinouts for the cables connecting these circuit packs are given in *System85 R2V4 to DEFINITY Communications System Generic 1.1 via ISDN PRI Access* (555-037-233), *DEFINITY Communications System Generic 1.1 to 4ESS via ISDN PRI Access* (555-037-234), and *DEFINITY Communications System Generic 2.1 to 4ESS via ISDN PRI Access* (555-037-237).

CONCLUSIONS ON SYNCHRONIZATION

Make no assumptions regarding synchronization. Reverify items such as the availability of a synchronization source, the clock stratum, and compatibility of every T1 span. The best guarantee is written confirmation that the local exchange carrier, AT&T Communications, or other vendor will either synchronize to a System 75, System 85, Generic 1, Generic 2, or provide an appropriate synchronization reference.

Develop a diagram showing the network synchronization plan. Make multiple copies of this diagram and keep a copy at each switch site. This diagram is essential for installing, administering, and *tuning up* a DS1 network. Such a diagram can also be used by maintenance personnel to troubleshoot network problems associated with synchronization.

A properly designed synchronization plan will improve the quality and reliability of a digital private network. If designing a synchronization plan becomes too complex or if many applications have a crucial dependency on the digital facilities, then the AT&T Synchronization Design Service should be consulted.

USE OF GENERIC 2 AS A SYSTEM CLOCK REFERENCE

To provide increased reliability, it is recommended that (for all cases) the primary and secondary system clock references be placed in different modules. Tips on how best to use a DS1 as a clock reference are provided next.

ISDN-PRI Trunk Facilities

ISDN-PRI trunks may terminate on a 4ESS toll office, 5ESS digital CO, System 85 R2V4, Generic 1, Generic 2, or compatible vendor's switch. Depending on other considerations, any of these terminating connections may be selected as either a primary or secondary synchronization reference. ISDN-PRI configurations may be established with an ANN35 or with a TN767 with or without a TN555, depending upon the D-channel configuration of the TN767. A brief description of these three boards and their general use for ISDN-PRI is given next.

The ANN11 is the DS1 board used with all System 85s and with traditional modules in Generic 2. The ANN35 is the ISDN-PRI board used with System 85, R2V4, and Generic 2 traditional modules. The TN767 is the DSl/ISDN-PRI board used with System 75, Generic 1, and Generic 2 universal modules. The TN555 is the packet adjunct used with Generic 2 universal modules. If the TN767 has a D-channel on it, it needs a TN555 located in the adjacent virtual slot.

Line-Only Mode DS1/DMI-BOS (ANN11 or TN767)

When using a line-only mode interface for synchronization purposes, the following facts should be known:

- Since the D4-channel bank (or equivalent) at the far end will be timed to the signal received from a DS1, no slips should occur on a line-only mode DS1 facility. Because of this, slip counts from line-only mode DS1s should not be used to determine the health of a clock reference (that is, they would tend to make the reference appear to be in better condition than it may be).
- Line-only mode DS1s should not be used as system clock references unless it is known for certain that the incoming DS1 is locked to the AT&T reference frequency. Normally, a DS1 facility terminating directly on a far-end D4-channel bank is not locked to the AT&T reference frequency.

Line+Trunk Mode DS1/DMI-BOS (ANN35 or TN767 with TN555)

Regarding the use of a line+trunk mode DS1/DMI-BOS for synchronization, the following point should be noted. Since it would be expected that a line+trunk mode DS1 would terminate at a class-5 or higher CO or at another switch, the line+trunk interface should be suitable for use as a primary or secondary clock reference (or to be the timing master for another switch).

The slip count provided by the interface should also be used in the process of choosing a healthy clock reference. However, when the interface terminates on a D4-channel bank (or equivalent) that is not locked to the AT&T reference frequency for its timing, then the interface should not be used for synchronization.

DMI-MOS (ANN35 or TN767 with TN555)

System 85 DSl/DMI-MOS (ANN35) will only terminate at a compatible computer. The computer must always obtain its timing from the switch. The switch should never select the DMI-MOS link as a timing reference.

Although those circuit packs that support connections to remote modules operate at the DS1's rate, they are not the same as the DS1/DMI/ISDN-PRI. Remote module connections cannot be used as a clock synchronization reference.

USE OF GENERIC 1 AS A SYSTEM CLOCK REFERENCE

To provide increased reliability, it is recommended that (for all cases) the primary and secondary system clock references be placed in different modules. Tips on how best to use DS1s as a clock reference are provided next.

Trunk-Mode ISDN-PRI (TN767)

ISDN-PRI trunks may terminate on a 4ESS toll office, 5ESS digital CO, System 85 R2V4, Generic 1, Generic 2, or compatible vendor’s switch. Depending on other considerations, any of these terminating connections may be selected as a primary or secondary synchronization reference.

Trunk-Mode Interface (ISDN-PRI + Robbed Bit) (TN767)

Since it is expected that a trunk mode DS1 would terminate at a class-5 or higher CO or at another switch, the trunk interface should be suitable for use as a primary or secondary clock reference (or to be the timing master for another switch). *

The slip count provided by the interface should also be used in the process of choosing a healthy clock reference. However, when the interface terminates on a D4-channel bank (or equivalent) that is not locked to the AT&T reference frequency for its timing, then the interface should not be used for synchronization.

Line-Only Mode DS1/DMI-BOS (TN767)

When using a line-only mode interface for synchronization purposes, the following facts should be known:

- Since the far-end D4-channel bank (or equivalent) is timed to the signal received from a DS1/DMI, no slips should occur on a line-only mode DS1/DMI facility. Because of this, slip counts from line-only mode DS1/DMI should not be used in the process of determining the health of a clock reference (that is, they would tend to make the reference appear to be in better condition than it may be).
- Line-only mode DS1/DMI should not be used as system clock references unless it is known for certain that the incoming DS1/DMI signal is locked to the AT&T reference frequency. Normally, a DS1/DMI facility terminating directly on the far-end D4-channel bank is not locked to the AT&T reference frequency.

Trunk-Mode DS1/DMI-MOS (TN767)

For Generic 1, DS1/DMI-MOS (TN767) will only terminate at a compatible computer. The computer must always obtain its timing from the switch. The switch should never select the DMI-MOS link as a timing reference.

NOTE: For Generic 1, the TN722 may be used instead of the TN767 for non-ISDN applications.

6. PORT TYPES/INSTALLATION COMPATIBILITIES

This chapter describes the operating modes, installation compatibilities, and port types supported by DS1s. Because of differences between Generic 1 and Generic 2 software and hardware, appropriate distinctions are identified and separate sections provided.

To date, DS1s have been well accepted. For both Generic 1 and Generic 2, DS1s were initially available for providing digital tie trunks. Later versions of DS1s and later releases and versions of the switch software provide additional capabilities. These later version circuit packs are always backward compatible with previous types.

However, new capabilities that depend on software may only be available on the earlier releases when the required software is provided, whether the software is a patch or later issue of the tape. Not all new capabilities are backward compatible to earlier releases and versions. Table 6-1, *Supported Digital Facilities,* lists the available capabilities and the hardware and software dependencies.

Engineering problems are minimized by having a good understanding of:

- DSl/DMI, and ISDN-PRI capabilities
- Hardware and software compatibility requirements
- Services that the particular application requires
- All carrier facilities that will be used to complete the end-to-end transmission facility (both local exchange company (LEC) and toll network carrier)
- The labeled network diagram

Installation problems are minimized by proceeding from a labeled network diagram. Each DS1 or all intermediate transmission equipment, such as channel-expansion multiplexers (CEMs), channel-division multiplexers (CDMs), network channel-terminating equipment (NCTE), network carrier multiplexers, channel banks, or channel units, should be verified for compatibility. Verification includes a review of the administration options and, where appropriate, the option-switch settings.

Each end of the channel must be fully compatible For example, if at one end channel 1 is used as a tie trunk, then channel 1 at the distant end must also be used as a tie trunk. Or, if a group of channels (for example, 1-16) are administered for call-by-call (CBC) use at one end, then the same group of channels must also be used for call by call. If, at one switch, extended super framing (ESF), 24th-channel signaling, and the zero code suppression (ZCS) line-code format are optioned, then the distant end must be administered or optioned likewise.

CAUTION

The 551V channel service units will only function with the ZCS line-code format. They will not pass B8ZS bipolar violations. If the B8ZS line-code format is used for copper carrier facilities, then the 551V ST (or equivalent) NCTE should be installed and optioned accordingly.

The CDMs are T1 multiplexers that provide an economical means to independently access any of the 24 channels from a DS1 or T1 facility. This access means is called *per-channel drop and insert capability.* One line-interface unit, the CDM DS1, connects to the compatible equipment (such as, a Generic 1, Generic 2, CEM, or D4-channel bank). The other line-interface unit connects to the NCTE and T1 facility.

Dedicated data applications, both point-to-point and multipoint, can be connected to the CDM and inserted in selected channels. At the receive end, particular channels may be dropped from a DS1 or T1 facility by another CDM, or routed through a dedicated switch connection (DSC) as required.

TABLE 6-1. Supported Digital Facilities

DS1/DMI/ISDN-PRI Circuit-Pack Suffix Compatibility Matrix									
Signaling Type	**System 85 R2 and G2**						**System 75 R1 and G1**		
	Switch Version	**TN380**	**ANN11 (Note 1)**	**ANN35**	**TN555 (G2 Only)**	**TN767 (G2 Only)**	**Switch Version**	**TN722**	**TN767**
E&M Signaling	V1-V4,G2	B,C,D (Note 2)	B,C,D,E (Notes 2&3)	N/A	N/A	all	V2,V3,G1	all	all
Ground Start (CO, FX, WATS, RA, Plus DID)	V1-V4,G2 (Note 4)	C,D	C,D,E	N/A	N/A	all	G1	N/A	all (Note 5)
Loop Start (CO, FX, WATS, RA)	V3,V4,G2	C,D	C,D,E	N/A	N/A	all	G1	N/A	all (Note 5)
OPS Line (Note 6)	V3,V4,G2	C,D	C,D,E	N/A	N/A	all	G1	N/A	all
DMI-BOS (Note 3)	V3,V4,G2	C,D	D,E	N/A	N/A	all	V2,V3,G1	B	all
DSC (analog data)	V3,V4,G2 (Note 7)	C,D	C,D,E	all	N/A	all	N/A	N/A	N/A
DMI-MOS and ISDN (Note 8)	V4,G2	D	N/A	all	N/A (Note 9)	all	G1	N/A	all
Proprietary	V1-V4,G2	B,C,D (Note 2)	C,D,E	N/A	N/A	all	V2,V3,G1	all	all

NOTES:

1. The ANN11E and ANN11C have similar functions with one exception: the ANN11E supports the DMI-BOS 24th-channel-signaling format and the ANN11C does not. The DMI-BOS format was added in addition to the proprietary 24th-channel and robbed-bit formats supported by ANN11C. The applications of these formats are summarized below in a feature comparison. The ANN11C and ANN11E are compatible with respect to all other options not listed in this table (including robbed-bit (RB) signaling, D4/ESF framing, and ZCS/B8ZS line coding).

SIG. TYPE ANN11 REQ	APPLICATIONS SUPPORTERD
Robbed Bit C or E	Voice-grade tie, DID, & Co trunks, OPS lines, connections to D4-channel banks, DSCs, ACCUNET® switched digital
Proprietary C or E 24th Chan.	AVD-tie trunks between System 85s and between System 85 and System 75
DMI-BOS E 24th Chan.	Proprietary 24th-channel format applications plus connections to any endpoint conforming to the "AT&T Digital Multiplexed Interface Technical Specification". Examples include 3B5 hosts, HP3000 hosts, and IBM® IDNX multiplexers. These endpoints are called "DMI-BOS endpoints" in these notes. Other vendor equipment is certified by AT&T for this connectivity. Certified equipment requires an ANN11E at the System 85 end.

Application issues about the ANN11C and ANN11E are summarized below. *

a. It is not necessary to administer a DMI trunk type (108 or 109) or set the "Application Type" in procedure 260 to "DMI-BOS" to use DMI-BOS signaling. To get DMI-BOS, use an ANN11E and administer 24th-channel signaling on the ANN11E by setting field 8 in procedure 260 to 0. This causes ANN11E firmware to use the DMI-BOS signaling format for all trunk types administered on that ANN11E. The only exception is where an ANN11E is connected to an ANN11C that is also administered for 24th-channel signaling (see item c below).

b. ANN11E provides both DMI-BOS and proprietary 24th-channel signaling types. However, these two signaling types are not selectable via ANN11E administration. When administered for 24th-channel signaling, the ANN11E defaults to DMI-BOS. However, an ANN11E may still be connected to an ANN11C. The ANN11E will automatically determine when the ANN11C (or any other endpoint) is using proprietary signaling and switch to proprietary 24th-channel signaling to maintain compatibility.

c. DMI trunk types 108 and 109 are intended for connections to DMI host computer endpoints and for ACCUNET switched digital service. The primary difference of trunk types 108 and 109 is that they inhibit the use of “Data Answer tone” on the trunk. Examples of applications requiring this are a DMI-BOS trunk to a host (which uses DMI-BOS 24th channel signaling) or an ANN11 used for ACCUNET switched digital service access (which requires robbed-bit signaling). Again, trunk types 108 and 109 are not the only trunk types that can provide DMI-BOS signaling. This matters for "non host" DMI-BOS endpoints, such as the IBM IDNX multiplexer. This multiplexer requires DMI-BOS 24th-channel signaling but is not a host. Therefore, the ANN11E that terminates on an IDNX should be administered as any appropriate trunk type other than 108 or 109. Note that, at present, DMIs are only certified for switch-to-host connectivity and not for switch-to-switch connectivity, which appears to be the application of the IDNX multiplexer. This is now the only application of DMI that requires trunk types other than 108 or 109.

d. ANN11C may be used in any R2 switch supporting DS1 trunks. However, there is one caveat that applies to switches supporting DMI host trunk types 108 and 109 (System 85 R2V3 and later). If the ANN11C is administered for 24th-channel signaling, it will use the proprietary type. This means that it will work as long as it is connected to a System 75 or System 85 but will not work if connected to another vendor’s DMI-BOS endpoint using trunk type 108 or 109.

e. Setting the “Application Type” field of procedure 260 to "DMI-BOS" prevents the associated ANN11 board from being used as a clock reference by a system clock synchronizer. This is only useful when the ANN11 connects to a host. Here, the host loop times to the switch and cannot be used as a clock reference.

f. An ANN11D is equivalent to an ANN11E. The E suffix came from adding a fiber interface to the ANN11D. However, the fiber connectivity was not pursued. ANN11Ds were produced in limited numbers for System 85 R2V4.

g. The DMI-BOS signaling supported by ANN11E from System 85 R2V3 and later should not be confused with DMI-MOS supported by ANN35 (Primary Rate Interface) from System 85 R2V4 and later.

2. The TN380B (module processor) and ANN11B (DS1) are manufacture discontinued (MD) and are not available for R2V3 or later versions. For duplicated modules, both modules must always be equipped with the same type of module processor, both modules must be equipped with the TN380C or TN380D circuit packs. (TN380D supersedes TN380C and earlier in ISCN 249DR.)

   The TN580 has all functions of the TN380D.

3. For R2V1 System 85s (version 1.5 or later software) and R2V2 System 85s (version 1.3 or later software) equipped with the TN380C and ANN11C/D circuit packs, the following port types may also provide ground-start, FX, WATS, RA, PBX/CO, and DID trunks via the DS1 facility.

4. The DMI-BOS is available with the ANN11D, ANN11E, and TN722B circuit packs. The ANN11D is only used on some R2V4 CIs. The ANN11E supersedes the ANN11C as the production model. For System 85 and Generic 2, DMI-MOS is available with the ANN35 circuit pack (traditional modules) and with the TN767 or TN555 circuit pack (universal modules).
5. For Generic 1, DS1, CO, and foreign exchange (FX) with TN767.
6. The OPS line option is initially available with the TN380C, TN380D, ANN11C, ANN11D, and ANN11E circuit packs. Therefore, the R2V3 software (or later version) is required for administration purposes (procedure 000).
7. System 85 R2V3 for analog DSC endpoints; System 85 R2V4 for added digital endpoints.
8. The dynamic trunk group includes CO trunk types (17, 27, and 30), tie trunk types (41, 42, 43, 46, and 47), as well as DMI trunk types (108 and 109).
9. This requires an accompanying TN555 circuit pack to terminate the D-channel.

Six different types of channel units may be used to provide drop or insert channels. The 4-wire E&M tie trunk is compatible with DS1 tie trunks and may be used for the dedicated switch connection. The All-Rate OCU Dataport — RS-232C (2.4, 4.8, 9.6K-bps) or V.35 (56K-bps) is compatible with an identical channel unit when configured in a D4-channel bank. All other CDM channel units must terminate at a distant CDM on the same channel with an identical channel unit. The emphasis here is what is on one end must be compatible with what is on the other end, channel per channel.

The D4-channel bank is versatile. It may be used as customer-premises equipment to support both circuit-switched (such as with a switch) and dedicated-line applications. The D4-channel banks can also be used at an analog end office (class 5) or configured to provide both voice and data interfaces to a digital toll office (4ESS).

Although the D4-channel bank is compatible with other devices using D4 standards, its most frequent application (from this document's perspective) is as the interface between a DIMENSION® and DS1 or T1 facilities. The physical connections from the D4 to the switch are identical to connections used in any 4-wire analog tie trunk connection. The 4-wire E&M-ER tie trunk should be used because these units include variable attenuators in the range between 0 and 25.5 dB. Therefore, external attenuator pads are not required. Since both analog and digital tie trunks are involved in the end-to-end link, the end-to-end transmission facilities (called a *combination tie trunk).*

GENERIC 1 DS1/DMI-BOS

The operating mode and supported port types for Generic 1 DS1/DMI-BOS are described next.

Operating Mode

There are no special slot or option strap considerations for Generic 1 DS1/DMI, as with Generic 2. The TN722, TN722B, and TN767 plug into any normal port slot in the system.

Supported Port Types

The TN722 and TN722B only emulate tie-trunk signaling. That is, they provide 2-state signaling (on-hook/off-hook signaling). Two categories of trunk types perform 2-state signaling: tie trunks and DMI trunks.

The TN767 circuit pack provides CO in addition to tie and DMI trunk types. That is, it provides 4-state signaling (on-hook/off-hook signaling as well as ringing and no-ringing indication, and reverse battery).

NOTE: No restrictions are placed on the type of framing, signaling, or line-coding options used with any of the port types. However, take care to assure that the interface options are compatible with the distant endpoint (D4-channel banks are not now compatible with 24th-channel signaling; most D4-channel banks do not support ESF framing).

Tie Trunk

Generic 1 DS1/DMI tie trunks appear to the switch software as a TN760B analog tie trunk. Therefore, things that can be administered for a digital tie trunk can also be administered for an analog tie trunk (except for alternate voice/data (AVD) common-type trunks).

A tie trunk port presents an interface of a channel unit requiring tie trunk signaling to a far-end D4-channel bank. Since six types of tie-trunk channel units use the same digital signaling format, there may not be a one-to-one relationship between a DS1/DMI tie-trunk port and the channel unit on which it terminates at a channel bank. The six types of channel units are types I, II, and III 2-wire E&M, and types I, II, and III 4-wire E&M. While these channel units have the same digital interface, they differ in their analog voice interfaces (2- or 4-wire) and in the type of E&M (analog) signaling to which DS1/DMI signaling states are converted (type I, II, or III).

A Generic 1 analog tie trunk is a 4-wire type I E&M trunk. Thus, a DS1/DMI tie-trunk port can be considered to be the same, and a 4-wire type I channel unit (or its equivalent) could be used to interface to a DS1/DMI tie-trunk port at the far end.

It appears that any of the other five types of E&M channel units could be used as well, although this capability has not been tested.

DMI Trunks

The DMI trunks are used to provide 64K-bps data connectivity to a host computer or to provide both voice and 64K-bps data connectivity to private or public networks that support DMI-BOS signaling. These trunks must be optioned for the DMI-BOS 24th-channel signaling format. The DMI specification requires one of the four following trunk types: wink-in/wink-out, wink-in/auto-out, auto-in/wink-out, and auto-in/auto-out though Generic 1 does not restrict other trunk types from being administered. These trunk types are administered the same way as other trunk types.

GENERIC 1 ISDN-PRI

All operating modes and supported trunk types of Generic 1 DS1/DMI-BOS are supported for Generic 1 ISDN-PRI. In addition, ISDN-PRI is available with a TN767. Refer to chapter 7, *Administration Options and Requirements*, for specific administration information.

SYSTEM 85 DS1, TRADITIONAL MODULES (ANN11)

The operating mode and supported port types for System 85 DS1 (ANN11) in traditional modules are described next.

Operating Modes

The two operating modes and grouping rules are described next.

Line-Only Mode

The line-only mode of a DS1 allows up to 24 analog stations (and optional modems) to be remoted through a DS1 facility. A D4-channel bank or its equivalent is required at the off-premises end.

> **NOTE:** Each DSl/MFAT carrier may contain a maximum of four DS1 circuit packs that function in line-only mode. These circuit packs may only be located in physical carrier slots 0, 5, 13, and 18. For a DS1 to function in line-only mode (rather than line+trunk mode), those slots containing the DS1 circuit packs must be configured with an option strap. This strap connects backplane pins 208 and 224. For J58888N1 List 2 Modification C or later, the carrier is manufactured with the strap always installed on slots 0 and 13. The strap may be field installed on slots 5 and 18, as required.

In line-only mode, a DS1 provides the equivalent of three analog OPS circuit packs, each containing eight ports. The line-only DS1 thus requires three carrier slots: one for the actual circuit pack and two more as virtual slots. The term *virtual* is used to represent slots whose backplane signals are used by the line-only mode DS1, but not physically occupied by the interface. Virtual slots result from a physical limitation in the number of time slots that are available in each carrier slot.

Only 8 time slots per carrier slot are available to OPS circuit packs. Since a DS1 uses 24 time slots, it must use the time slots associated with the occupied carrier slot, plus those from 2 additional slots. The two virtual slots associated with the real line-only mode DS1 always occupy the two carrier slots immediately to the right of the real DS1.

WARNING

These two virtual slots must be left vacant. Otherwise, circuit packs inserted in these slots may be damaged along with the DS1.

A fully equipped carrier contains four line-only DS1s and has four other slots available for analog-type circuit packs. These other slots are physical slot numbers 3, 8, 16, and 21. Therefore, a single carrier can provide up to 96 digital OPS ports. Figure 6-1, *Physical and Virtual Carrier Slot Relationships, Line-Only Mode,* shows the carrier slots, physical versus virtual slot locations, and their relationship to OPS port numbers.

Line+Trunk Mode

The line+trunk mode of a DS1 provides the capability of mixing both lines and trunks on the same DS1 facility.

The DS1 works (by default) in line+trunk mode, unless the backplane strap is configured. Here, a DS1 provides the equivalent of six analog circuit packs, each providing four ports. The line+trunk DS1 thus requires six slots: one for the actual circuit pack and five as virtual slots. Virtual slots mean the same thing for line+trunk mode as they do for the line-only interface with one variation: virtual slots provide four ports for the line+trunk mode versus eight ports for the line-only mode.

System 85 hardware allows a maximum of four trunk circuits per slot. Therefore, line+trunk mode only uses four backplane time slots from each of the six carrier slots. Thus, a maximum of four OPS ports may be administered for any one of the virtual (or actual) slots.

A maximum of two line+trunk circuit packs may be configured in each carrier. They may only be placed in slots 5 and 18. Therefore, with line+trunk mode, the carrier will support a maximum of 48 digital trunks or 48 OPS ports. Virtual slots are the leftmost three slots of the left quarter and the two slots immediately to the right of the real DS1 in the right quarter of the half carrier in which the DS1 is contained. These virtual board locations must be left vacant or damage to a port board and the DS1 could result. *

A carrier equipped with two line+trunk DS1s will have four slots available for other port boards in physical slots 3, 8, 16, and 21. Figure 6-2, *Physical and Virtual Carrier Slot Relationships, Line+Trunk Mode*, shows the carrier slots, physical versus virtual slot locations, and their relationship to line+trunk-mode use.

Because line+trunk mode requires six carrier slots while line-only mode requires only three, mode selection is not made a software configurable option.

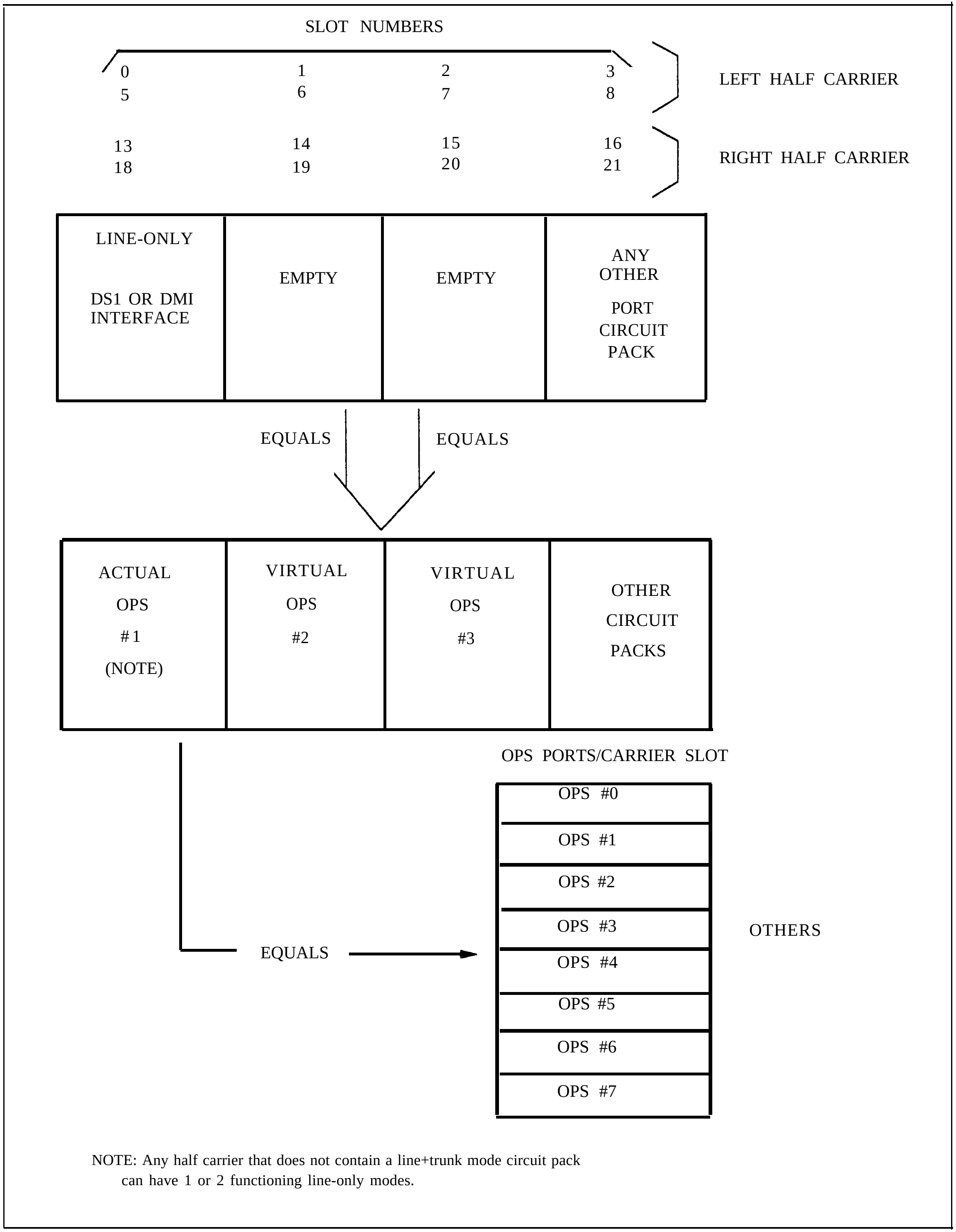


Figure 6-1. Physical and Virtual Carrier Slot Relationships, Line-Only Mode

7. ADMINISTRATION OPTIONS AND REQUIREMENTS

Administering DS1/DMI/ISDN-PRI services involves configuring the software translations to know what the equipment-carrier configuration and circuit pack types are and what services are to be done.

For System 85 R1 through R2V3, switch administration may be done from the system-management terminal (SMT), maintenance and administration panel (MAAP), or Remote Maintenance, Administration, and Traffic System (RMATS)-II. A System 85 R2V4 includes an additional administration terminal known as the *visual maintenance and administration panel* (VMAAP). These administration terminals use flipchart *procedures.*

NOTE: Although flipchart procedures are used for System 85 administration, Manager II screens are shown instead of the actual flipcharts. Field numbers for the Manager II screens are exact correlations to field numbers for flipchart procedures.

Generic 2 is significantly different and may only be administered via a MS-DOS® based computer running the Manager II applications software. The Manager II applications software provides three modes of operation. The modes are called:

- Basic mode
- Enhanced mode
- Task mode

The enhanced mode consists of fill-in-the-blank screen-display procedures that contain many of the same fields as the flipchart procedures. However, with enhanced mode, each screen-based procedure provides a user-friendly interface with optional pop-up help instructions. Therefore, with Manager II, Generic 2 is administered similarly to System 75, System 75XE, and Generic 1.

Because Generic 2 administration is significantly different from previous System 85 releases and versions, this administration section contains a separate heading that includes descriptions on how to administer DS1/DMI/ISDN-PRI services for Generic 2.

For System 85, administering DS1/DMI-BOS/DMI-MOS simply consists of translating procedures 250, 260, and 116. Being familiar with administering these procedures is a good starting point for understanding the options and requirements of ISDN-PRI. Administrating ISDN-PRI uses procedures 250, 260, 116, plus several additional procedures.

Some applications (such as off-premises station or *OPS)* may also require that other additional procedures be administered.

Generic 1 may be administered from a Manager I terminal or by the Initialization and Administration System (INADS). Generally, the administration procedures consist of executing the proper administration and maintenance commands (from the command line feature set) and translating, in the required order, the following screen-based forms:

- DS1 circuit pack
- Sync-plan
- DMI-BOS (when required)
- Trunk group (as required)
- Trunk member assignments (as required)

SYSTEM 85 (R2V1 THROUGH R2V4)

This part describes administration options and requirements for System 85 R2V1 through R2V4.

NOTE: Screens shown in the System 85 portion of this chapter are from the Manager II administrative terminal. These fields correspond directly to the fields on flipcharts. That is, the field 1 of procedure 275, word 4, on the Manager II screen is the same as field 1 of procedure 275, word 4, on the flipchart.

Procedure 275 Word 4: ISDN Service — Enable/Disable

Procedure 275 is used to translate the system class-of-service (COS) assignments as well as several other miscellaneous services and features. Word 4 provides the capability for enabling and disabling the ISDN service. Figure 7-1, *Procedure 275 Word 4: System COS and Miscellaneous Service Assignments (System 85 R2V4),* depicts procedure 275, word 4.

```
                    ENHANCED MODE - PROCEDURE:  275, WORD:  4
                          SYSTEM COS - MISCELLANEOUS

 1. Code Calling Access Digits: [-]         13. CMS Status: [-]
 3.    Trunk-to-Trunk Transfer: [-]         14. ISDN Status: [-]

ATTENDANT RELEASE LOOP OPERATION           ADMINISTRABLE ALARMS
   4.                Status: [-]             15. Even Port Peripherals: [-]
   5. Timed Recall Timer: [--]               16.        Trunk Software: [-]
                                             17.     Auxillary Software: [-]
 6. Default Recent Disconnect Interval: [---]
                                           DISPLAY ONLY
MAXIMUM PREEMPTION LEVEL                     18. Local Switch Number: [---]
   7. All Incoming: [-]
  OUTGOING
     8.  Terminal: [-]
     9. Attendant: [-]

10. AUTOVAN Interface Switch: [--]
11.  ACD Abandon Call Search: [-]

Connected to CC0 ON-LINE  | MAJOR | MINOR | RUN TAPE | BUSY OUT | IN USE | WAIT |

enter command: _
|        |        | F3 DATA |        | F5 HELP | F6 FIELD | F7 INPUT | F8 CMDS |
```

Figure 7-1. Procedure 275 Word 4: System COS and Miscellaneous Service Assignments (System 85 R2V4)

Field 14 *V4 Only*

For System 85 R2V4, field 14 must always be translated. Field encodes and their descriptions are:

- – (Dash) required when ISDN is not provided. Current policy is to always ship ISDN-PRI software with the switch. However, the administration software still provides the option to show that this software is not provided.
- 0 Must be translated when ISDN is provided but disabled.
- 1 Must be translated to enable ISDN service.

Procedure 276 Word 1: Other Feature Groups

Use this procedure to turn optional networking features such as AAR, DCS, SNC, Look-Ahead Interflow, and Intergrated Telemarketing Gateway (ITG) or to see wich of these features are turned on. Figure 7-2, *Procedure 276 Word 1: Feture Group COS (System 85 R2V4),* depicts this procedure.

```
                 ENHANCED MODE - PROCEDURE:  276, WORD:  1
                       FEATURE GROUP CLASS OF SERVICE

 1.                 Standard Network: [-]
 2.                     Multipremise: [-]
 3.                              DCS: [-]
 4.                          AUTOVON: [-]
 5.                  Call Vectoring: [-]
 6.                  Tenant Services: [-]
 7.                    System 85 SE: [-]
 9.             Look-Ahead Interflow: [-]
10. Integrated Telemarketing Gateway: [-]

DISPLAY ONLY
  11. Use Procedure: [---]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[        ] [        ] [F3 DATA] [        ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-2. Procedure 276 Word 1: Feature Group COS (System 85 R2V4)

Procedure 250 Word 1: DS1 — Carrier Designation

Primarily, procedure 250 is used to assign the equipment carriers to a module and cabinet. Additionally, it is also used to assign the type of carrier, the carrier port electrical number, and whether the carrier is equipped with a synchronization clock (SC). Figure 7-3, *Procedure 250 Word 1: System Configuration, Carriers (System 85 R2V4),* depicts procedure 250, word 1.

```
                    ENHANCED MODE - PROCEDURE:  250, WORD:  1
                                   CARRIERS

CARRIER LOCATION                              LOCAL RMI LOCATION
   1.  Module: [--]                              12.  Module: [--]
   2. Cabinet: [-]                               13. Cabinet: [-]
   3. Carrier: [-]                               14. Carrier: [-]
                                                 15.    Slot: [--]
 4. Carrier Type: [--]

MODULE CONTROL
   5.         I/O: [-]
   6.         PDS: [-]
   7. Duplicated: [-]
   8.         TMS: [-]

 9. Port Electrical Carrier: [--]
10.  TMS Electrical Carrier: [-]
11.            SC Equipped: [-]

Connected to CC0 ON-LINE [MAJOR][MINOR][RUN TAPE][BUSY OUT][IN USE][WAIT]

enter command: _
[      ][      ][F3 DATA][      ][F5 HELP][F6 FIELD][F7 INPUT][F8 CMDS]
```

Figure 7-3. Procedure 250 Word 1: System Configuration, Carriers (System 85 R2V4)

DS1 circuit packs may only be installed within DS1 port carriers. Each System 85 that is equipped with one or more DS1s will also contain a TN463 SC. For single-module systems, the SC is located in the module control carrier along with the TN460 module clock. For multimodule systems, the SC is located in the TMS carrier.

Fields 1-3 *V1-V4*

Identifies a module number (0-30), cabinet number (0-7), and physical carrier position (0-3).

Field 4 *V1-V4*

Translates a particular type of carrier (such as DS1/MFAT, module control, or TMS) to the equipment location identified by fields 1-3. For DS1/DMI/ISDN-PRI applications the pertinent encodes are:

4 TMS 0 control

5 TMS 0 growth

6 Module control 0

7 Module control 1

8 TMS 1 control

9 TMS 1 growth

11 DS1/MFAT port carrier

Select a particular encode based on the intended purpose for translating this procedure, either to assign the SC or to assign a DS1/MFAT carrier.

Fields 5-10 *V1-V4*

DS1/DMI/ISDN-PRI does not place any additional requirements on translating these fields.

Field 11 *V1-V4*

Field encodes and their descriptions are:

0 When the carrier (which is identified by fields 1-10) is not equipped with an SC. When an external synchronization clock is used, do not administer the SC. The SC software functions are replaced by the hardware/firmware contained within the external clock.

1 When the carrier (module control or TMS) is equipped with an SC. The network synchronization plan should be available, and is required, to determine how to properly synchronize the switch.

Fields 12-15 *V1-V4*

Not applicable for DS1/DMI/ISDN-PRI applications. Therefore, a dash (-) is appropriate.

Procedure 260 Word 1: DS1/DMI/ISDN-PRI Physical Interface

System 85 R2V3 DS1 administration software (procedure 260) contains all the same fields, options, and considerations as R2V1 and V2. Procedure 260 also provides a new field (14) for defining new application types for DS1 facilities. The R2V3 systems require the ANN11C, ANN11D, or ANN11E vintage circuit pack to provide the OPS line option. The ANN11D or ANN11E is required to provide the DMI-BOS option.

System 85 R2V1 and V2 only provide trunks. However, R2V3 and V4 provide trunks, analog OPS lines, and DMI-BOS trunks. System 85 R2V4 (and later versions) provides DMI-BOS trunks; refer to table 7-1, *DS1 Administration — Channel Versus Line Assignments.*

Depending on the application type (encode) translated, there may be additional administration, slot, and port grouping restrictions.

Procedure 260 is used to administer the DS1/DMI/ISDN-PRI Interfaces (ANN11B, ANN11C, ANN11D, ANN11E, or ANN35). Figure 7-4, *Procedure 260 Word 1: System Configuration, Circuit Pack Assignments (System85 R2V4),* shows procedure 260, word 1.

```
                ENHANCED MODE - PROCEDURE:  260, WORD:  1
                  DS1/ISDN AND RG CIRCUIT PACK ASSIGNMENTS

EQUIPMENT LOCATION                       SC
   1.  Module: --                          12. Equipment Type: -
   2. Cabinet: -                           13.  SC Reference:  -
   3. Carrier: -
   4.    Slot: --                        14.   Application: --
                                         15. Bit Inversion: -
SIGNALING                                16.     Link Type: -
   6.  Framing: -                        17.         SA/FX: -
   7.  PCS/CCS: -
   8.  24C/RBS: -                        DISPLAY ONLY
   9. ZCS/B8ZS: -                          18. SC Information: --

10.    Slip Enable: -
11. External Loop: -

Connected to CC0 ON-LINE  MAJOR  MINOR  RUN TAPE  BUSY OUT  IN USE  WAIT

enter command: _
            F3 DATA          F5 HELP  F6 FIELD  F7 INPUT  F8 CMDS
```

Figure 7-4. Procedure 260 Word 1: System Configuration, Circuit Pack Assignments (System 85 R2V4)

Fields 1-4 *V1-V4*

Assigns the circuit pack to an equipment location. These assignments include the module number (0 through 30), cabinet number (0 through 7), DS1/MFAT carrier number (0 through 3), and slot number (5 or 18) for line plus trunk operation; or slot numbers (0, 5, 13, or 18) for line-only operation.

System 85 R2V4 permits only trunk mode operation (that is, only slot numbers 5 or 18 can be assigned).

Field 5 *V1-V2*

For DS1, 0 is the only choice.

V3-V4

This field is reserved for further use and contains a dash `(-)`.

Field 6 *V1-V4*

Used for assigning the framing format. The choices are D4 and ESF (previously called F_e).

The choice of framing format is totally dependent on the equipment connected to the interface (such as D4-channel bank, channel-division multiplexer or *CDM*, channel-expansion multiplexer or *CEM*, host computer, and other switches). Normally the format is not dependent on facilities used, but older digital radio equipment may still be in place that only supports D4. The extended superframe (ESF) format consists of a better framing algorithm and therefore provides more reliable error detection than D4. ESF is preferred for T1 spans from System 75-to-System 75, System 75-to-Generic 1, System 75-to-Generic 2, System 75-to-System 85, System 85-to-System 85, System 85-to-Generic 1, and System 85-to-Generic 2. The D4 format should be selected for T1-spans connecting D4-channel banks and CDMs since they do not typically support ESF.

Field 7 *V1-V4*

Selects per-channel signaling or common-channel signaling. This option deals with the way signaling bits are constructed for each DS0 channel. The default option is per-channel signaling `(0)`.

Field 8 *V1-V4*

Offers the choice of 24th-channel or robbed-bit signaling (RBS). The choice of signaling method used is dependent on the application. The DS1/DMI-BOS applications may be translated for either option. However, ISDN-PRI applications always require that 24th-channel signaling be selected.

With RBS, information is transmitted in the least-significant bit (LSB) position of each channel every six frames. This effectively limits the channel's use to voice and voiceband analog data applications. Digital data ports connected to Digital Communications Protocol (DCP) data modules must use the modem pooling capability to transmit data over DS1/T1 RBS facilities. Analog data ports must be configured with analog modems.

24th-channel signaling multiplexes all signaling information for channels 1 through 23 into the 24th channel. This makes available the full 64K-bps bandwidth (of channels 1 through 23) for voice and/or digital data transmission called *alternate voice/data* (AVD).

AVD allows 64K-bps digital data to be transmitted over those digital trunk facilities that use 24th-channel signaling. Although AVD trunks are designed for digital data transmission, they may also be used for voice transmission. However, because of a modem-pooling limitation, AVD trunks cannot easily be used for analog voice-grade data transmission.

24th-channel signaling is required for those trunk groups that are translated AVD (from procedure 101, field 17).

Either the AT&T proprietary format or the DMI-BOS format may be used with another System 85 or System 75. The DMI-BOS format is required to provide 24th-channel signaling capability with other vendors' digital switches. 24th-channel signaling (both methods) is not compatible with D4-channel banks. The AT&T proprietary format is provided by the ANN11C version-8 (or later) circuit pack. All previous versions will eventually be replaced via a class-A change. The DMI-BOS format is provided by the ANN11D or ANN11E circuit pack. When 24th-channel signaling is optioned, the ANN11D or ANN11E circuit pack automatically interrogates the far-end and provides the required format. For System 75, the proprietary format is administered by translating a n in the *DMI-BOS* field. To select the DMI-BOS format, simply administer a y for the *DMI-BOS* field.

V3-V4

A mode 1 data call requires a Line+Trunk-mode circuit pack with RBS option or ISDN.

Field 9 *V1-V4*

Determines which line-coding format will be used to forcibly ensure that the data meets T1-carrier ones-density requirement. The two choices are:

- Zero code suppression (ZCS)
- Bipolar 8 zero code suppression (B8ZS)

For a 56K-bps call over a robbed-bit facility, use the ACCUNET switched digital service.

The ZCS line-coding format scans each byte for the all-zeroes octet and on detecting this bit sequence, substitutes a one for the zero in bit position two. The ZCS format is the most common and it is used widely. The ZCS format can be used (without any consideration of the communications protocol) to transmit seven-bit characters/data at rates up through 56K-bps via modems and multiplexers that do bit stuffing. If the data communications protocol is based on the high-level data link control (HDLC) protocol and data is transmitted as inverted HDLC, then the ZCS option can be used for data rates up through 64K-bps.

System 85 and System 75 data modules use the DCP protocol. The DCP protocol is based on the DMI specification (which uses HDLC mode 2,3 as a building platform) and therefore meet these conditions.

The DS1/T1 facilities that use RBS and are optioned for ZCS maintain the ones-density requirement by converting any all-zeroes octet to a string of seven zeros and a one. This does not significantly affect voice and voice-band data since it is in analog (pulse-code modulation of *PCM)* form. For DS1/T1 facilities that use 24th-channel signaling and are optioned for ZCS, the data communications protocol/communications equipment used must prevent the all-zeroes octet from occurring; otherwise, the ZCS method will forcibly alter the data (causing errors) to guarantee proper ones-density.

The B8ZS line coding format substitutes a unique code (bipolar violation code) for any eight consecutive zeros. This bipolar violation code is detected at the receiving end and converted back to the original string of eight zeros. The B8ZS encoding method permits data transmission at rates up through 64K-bps without consideration of the user data protocol.

Several different types of network digital facilities may be linked together to complete the end-to-end connection. Typically, they will be multiplex-derived facilities. Usually, the multiplexers will contain a bipolar violation monitor and removal circuit that corrects all bipolar violations (alters B8ZS data) and also produces an all 1s if a loss of input signal occurs. This bipolar violation monitor and removal feature is currently an inherent part of the MX3, M13, MX2, and M1C multiplexers, as well as most vendors multiplexers.

Field 10 *V1-V4*

This options enables `(1)` or disables `(0)` switching between the primary, secondary, or internal high-accuracy clock. The decision to switch from one source to the other is normally based on an internal slip count calculation (software record). However, hardware events (such as primary link failures) may take precedence over any software controls.

Slips are caused by differences in clock frequencies. A slip results in the deletion or repetition of a single frame. Slips are not caused by noise on the line.

DS1/T1 spans that are used to provide the primary and secondary synchronization reference should be administered for slip enable `(1).` Since the switch software does this automatically, this task is not mandatory but is a good procedure to follow. Typically, other DS1/T1 spans that are used for data applications and deemed important should also be administered for slip enable. This excludes all T1 -spans connecting channel banks, unless the channel bank is externally timed. Normally, DS1/T1 spans that are used exclusively for voice and not assigned as the primary or secondary synchronization source should be administered for slip disable `(0).` The goal is to keep that reference on-line, which minimizes slips for all those DS1/DMI Interfaces for which slips cannot tolerated.

The digital switch always maintains a slip-count record for each DS1. Slip counts are calculated on a 24-hour continuous interval. As a historical record, the slip counts for each DS1 are maintained for the last 24 consecutive intervals. The slip count is used to determine if a DS1 span is experiencing errors and, if so, the severity of the errors (type alarm).

If the primary facility uses 24th-channel signaling and if the secondary facility uses RBS, then the primary will always be on-line unless a hardware event forces a switch to the secondary. A software algorithm is used to select the facility (primary or secondary) that is on-line for the cases where:

a. Both primary and secondary facilities use the same type of signaling (either 24th-channel or RBS)

b. The primary uses robbed-bit, and the secondary uses 24th-channel signaling

The slip count can be viewed in procedure 625 test 1.

Criteria for Switching to the Secondary Facility

If 50% of the spans administered for slip enable are experiencing slips (with respect to the primary), then a decision is made to switch to the secondary. When a System 85 switches to its secondary, a software bit is set making the primary appear as though it exceeded its maximum slip limit. The primary is not reevaluated for one hour.

Criteria for Switching Back to the Primary Facility

At the end of the one-hour interval, the slip count is analyzed. If the primary slip count is less than 2, then a switch back to the primary is made. If the primary has a slip count of 44 or less and if the secondary and 50% of those DS1s that are enabled for slip enable have reached their maximum slip count of 88, then a switch back to the primary is made.

Field 11 *V1-V4*

Offers the options external loop not available (0) or external loop available (1). The external loop available option should only be selected when demand diagnostic maintenance is done and then only after a DS1 has been busied out. If DS1 is a primary or secondary reference, the reference should be switched off line. This option is used with procedure 620, test 2, to extend the range of the test to include the network channel-terminating equipment (NCTE) and the connecting facility.

The external loop available option should only be used for the duration of the test.

Field 12 *V1-V4*

Specifies whether (1) or not (0) the associated T1-span is used as an incoming synchronization source to the switch.

The network synchronization diagram should show those transmission facilities that are used for synchronization. Each switch permits a maximum of two interfaces (one primary and one secondary) to be translated (1) in field 12. However, there is no requirement to have both.

Field 13 *V1-V4*

Selects whether a DS1 facility (translated in field 12) is to be used as the primary or secondary synchronization source to the switch. Field encodes and their descriptions are:

0 The facility is not used as a synchronization source

1 The facility is the primary synchronization source

2 The facility is the secondary synchronization source

NOTE: The primary must be administered before the secondary. The secondary must be removed before the primary.

Only slots translated (1) and (2) must be configured with synchronization cables. These cables connect the backplane of the translated ANN11/ANN35 to the backplane of the TN463. The cables are identified as group 334 for intercabinet and group 361 for intracabinet applications.

CAUTION A loop-timing problem can be created if the synchronization sources are not administered correctly. The loop-timing problem exists as the result of an error where both switch endpoints (for the same T1-span) are administered as the primary. This causes the clock frequency to vary widely and result in bringing down the switch. Loop-timing problems can be avoided by following a correctly engineered network synchronization diagram.

Field 14 *V3-V4*

Field encodes and their descriptions are:

0 Selects the DS1/DMI-BOS channels used for both trunks and lines; the latter is frequently called OPS. Each DS1/MFAT carrier will support a maximum of two DS1s (slots 5 and 18).

The ACCUNET switched digital service can be provided by setting up a trunk group with encode 109. However, a DS1 must be optioned for RBS (procedure 260, field 8). The only other administration requirement is that the trunk groups translation (field 3 of procedure 100, word 2) be enabled for 56K-bps encode one. In a private network, this can be used to pass 56K-bps calls over robbed-bit facilities.

The trunk group used to provide ACCUNET switched digital service may contain as few as 1 or as many as 24 members. Therefore, the same DS1 may also be used to provide CO, foreign exchange (FX), Wide Area Telecommunications Service (WATS), Direct Inward Dialing (DID), and Remote Access trunks.

1 Selects the interface is used to provide DMI-BOS trunks. The DMI-BOS trunk groups are defined by using procedure 100, word 1 (encode 108 and/or 109).

The DMI-BOS application uses the switch's DS1 to provide a high-speed multiplexed data interface for connecting to compatible computers. The computers may be located on the same customer premises as the switch or many miles away. The DS1/T1-carrier facilities are used between the switch and the remote computers.

The DMI-BOS application provides 23 data channels plus 1 signaling channel. Each data channel can be considered a 64K-bps channel. However, permissible data rates are dependent on the trunk group translations selected in procedure 100, word 2.

24th-channel signaling is the only required service/facility option. All others (framing format and line-coding format) are DMI application independent. However, the distant computer and all intermediate T1 transmission equipment must be compatible.

CAUTION A loop-timing problem can be created if the synchronization sources are not administered correctly. The loop-timing problem exists as the result of an error where both switch endpoints (for the same T1-span) are administered as the primary. This causes the clock frequency to vary widely and result in bringing down the switch. Loop-timing problems can be avoided by following a correctly engineered network synchronization diagram.

NOTE: Neither DMI-BOS nor DMI-MOS may be used to provide synchronization to the switch.

2 Selects the DS1/DMI-BOS facility that provides 24 lines, called OPS.

DS1/OPS Related Translations

When a DS1 facility is used exclusively for lines, it must be administered for RBS. Also, the facility cannot be used as a synchronization reference.

When a DS1 is administered for lines (OPS), it provides 24 channels that terminate in a remote D4-channel bank, CDM, or their equivalent.

Each analog line circuit pack provides eight circuits. Therefore, one DS1/OPS replaces three analog circuit packs. Each DS1 or multifunction analog terminal (MFAT) carrier will support a maximum of four DS1s (OPS applications). These may be located in slots 0, 5, 13, and 18.

The DS1 channels are assigned to slot and circuit locations according to the order in which the module processor scans the equipment carrier. Table 7-1, *DS1 Administration — Channel Versus Line Assignments,* lists the equipment location versus DS1 channel assignments for DS1/OPS.

Analog equipment location assignments are administered by procedure 000, word 1, with field 8 translated a `2.` The DS1/OPS channels are translated to equipment locations (individual extensions) with procedure 000, word 1, with field 8 translated `9,` rather than with procedure 116 that was used for trunks.

5 Selects the DS1 used to provide 64K-bps data with DMI-MOS or ISDN-PRI trunk facilities. When encode 5 is administered, procedure 262 is automatically translated with standard default options. These default options should (later) be checked for consistency with the distant end; refer to procedure 262.

TABLE 7-1. DS1 Administration — Channel Versus Line Assignments

DS1 Channel	Slot/Circuit	DS1 Channel	Slot/Circuit
1	0/0, 5/0, 13/0, or 18/0	13	0/4, 5/4, 13/4, or 18/4
2	1/0, 6/0, 14/0, or 19/0	14	1/4, 6/4, 14/4, or 19/4
3	2/0, 7/0, 15/0, or 20/0	15	2/4, 714, 15/4, or 20/4
4	0/1, 5/1, 13/1, or 18/1	16	0/5, 5/5, 13/5, or 18/5
5	1/1, 6/1, 14/1, or 19/1	17	1/5, 6/5, 14/5, or 19/5
6	2/1, 7/1, 15/1, or 20/1	18	2/5, 7/5, 15/5, or 20/5
7	0/2, 5/2, 13/2, or 18/2	19	0/6, 5/6, 13/6, or 18/6
8	1/2, 6/2, 14/2, or 19/2	20	1/6. 6/6 14/6. or 19/6
9	2/2, 7/2, 15/2, or 20/2	21	2/6, 7/6, 15/6, or 20/6
10	0/3, 5/3, 13/3, or 18/3	22	0/7, 5/7, 13/7, or 18/7
11	1/3, 6/3, 14/3, or 19/3	23	1/7, 6/7, 14/7, or 19/7
12	2/3, 7/3, 15/3, or 20/3	24	2/7, 7/7, 15/7, or 20/7

Field 15 *V4 Only*

ZCS facilities require that the contents of the D-channel be inverted to guarantee that the minimum ones-density be maintained. This field shows whether the signaling channel is inverted. Field encodes and their descriptions are:

- – (Dash) means ZCS chosen in procedure 260. This is the default when ZCS is chosen (this automatically inverts the D-channel).

  The dash is appropriate for all applications of the ANN11 circuit pack. RBS does not use the 24th-channel to transmit signaling information. 24th-channel signaling via BOS uses A and B bits for signaling, and the channel structure is such that the ones-density is never violated.

- 0 Selects inverted signaling information (contents of the 24th-channel). Either 0 or 1 must be administered for MOS. Recall that B8ZS is recommended for MOS-based applications. However, not all transmission facilities will permit B8ZS on an end-to-end basis. Administration must be coordinated with the network facilities/distant-end to ensure compatibility.

  NOTE: This field must be a dash (–) when ZCS line coding is selected with ISDN.

- 1 Selects uninverted signaling information (contents of the 24th-channel). The 1 option (no inversion) is recommended for use when B8ZS is administered.

Field 16 *V4 Only*

The DS1/DMI-BOS applications should be administered with a (–).

The DMI-MOS/ISDN-PRI applications should be optioned (0) for use when connecting to metallic copper cable. Connections to fiber cable are not currently supported. Therefore, option one is not applicable.

Field 17 *V4 Only*

This field is added to bring a System 85 R2V4 into compliance with EIA specification PIN-1429. This EIA specification relates to BOS; MOS is defined by a CCITT specification. Field encodes and their descriptions are:

- – (Dash) means not applicable. The dash is appropriate for all applications of the ANN35 circuit pack (both DMI-MOS and ISDN-PRI).
- 0 Appropriate for all applications of DS1/DMI-BOS except when connecting to a switch that uses the Canadian style of signaling.
- 1 Selected when connecting to a DS1/DMI-BOS that uses the Canadian style signaling as specified in PN-1429.

Procedure 262 Word 1: ISDN Board Parameters

Procedure 262 is used in System 85 R2V4 and Generic 2 to administer DMI-MOS (ANN35) for other service/facility options (DMI-MOS/ISDN-PRI only). Figure 7-5, *Procedure 262 Word 1: ISDN Board Parameters,* depicts procedure 262, word 1.

```
                 ENHANCED MODE - PROCEDURE:  262, WORD:  1
                          ISDN BOARD PARAMETERS

EQUIPMENT LOCATION
   1.  Module: [--]
   2. Cabinet: [-]
   3. Carrier: [-]
   4.    Slot: [--]

PRI PARAMETERS
   5. Interface Type: [-]
   6.          Facility Test Code: [--]
   7. Terminal Endpoint Identifier: [---]

PRI LAYER 2 PARAMETERS
   8.   Timer T203: [---]
   9.   Timer T200: [---]
  10. Counter N200: [--]
  11.    Counter K: [-]

Connected to CC0 ON-LINE [MAJOR][MINOR][RUN TAPE][BUSY OUT][IN USE][WAIT]

enter command: 
[        ][        ][F3 DATA][        ][F5 HELP][F6 FIELD][F7 INPUT][F8 CMDS]
```

Figure 7-5. Procedure 262 Word 1: ISDN Board Parameters

Fields 1-4 *V4 Only*

Assigns the circuit pack to an equipment location. These include the module number (0 through 30), cabinet number (0 through 7), DS1/MFAT carrier number (0 through 3), and slot number (5 or 18).

NOTE: Entries for these four fields are the default values from translating a `5` in field 14 of procedure 260. These entries should always be correct.

Field 5 *V4 Only*

Assigns the interface type or side. The default option is `(0)` for user side. Alternately, a `(1)` should be administered for network side. The configuration of the network should be analyzed to determine if the `(0)` option is appropriate.

For MOS-type facilities (such as DMI-MOS and ISDN-PRI), each link must be segmented into user and network sides. Each System 85 R2V4 MOS-based transmission facility connecting to the public network will always be the user side `(0)`, while the network switch (for example, a 5ESS or 4ESS) is defined as the network side `(1)`. For private network DMI-MOS and ISDN-PRI connections, additional care must be exercised in defining user and network sides. Specifically, only one end must be administered user side `(0)`, while the alternate must be defined as the network side `(1)`. If the private network node is a tandem switch, then that node may function as both user side and network side depending on the particular facility.

NOTE: For System 85 R2V4 DMI-MOS to host computers equipped with MOS, the computer should always be assigned as the network side.

Field 6 *V4 Only*

Administers the facility test code. For most installations it is desirable to enable or establish permission, thus allowing selected maintenance software to test the DMI-MOS/ISDN-PRI transmission facility on a demand basis.

Procedure 648 contains several tests that may be done on a demand basis (by executing procedure 648) when facility test code 1, 2, or 3 is administered).

The DMI-MOS/ISDN-PRI communication protocol consists of three layers or levels. Level 1 is the physical layer. Level 2 is the data link layer. Level 3 is the network layer, also called the *link access procedure on the D-channel* (LAPD).

Field encodes and their descriptions are:

`0` Disables or prohibits maintenance testing from being done on the specified (module, cabinet, carrier, and slot) transmission facility.

`1` Selects level-2 testing via procedure 648.

> **NOTE:** This encode should be translated for all DMI-MOS to host computer links.

`2` Selects level-3 (network layer) testing. Level 3 does loopback testing and requires the use of a separate special test line (SN261C Analog Digital Facility Test Circuit).

`3` Permits both level-2 and level-3 tests to be done.

> **NOTE:** This encode should be translated for all ISDN-PRI connections that terminate on a 4ESS.

Field 7 *V4 Only*

This field will accept encodes within the range of 0 through 126. However, all point-to-point (nonswitched) links, such as an System 85 R2V4 DMI-MOS link to a host computer, must be administered with encode 0. Encodes 1 through 126 are not used at this time.

Field 8 *V4 Only*

The field will accept encodes ranging from 0 through 255, corresponding to 1-second intervals for an elapsed time of up to 4 minutes and 15 seconds. The default value for this T203 timer is 30, meaning 30 seconds.

This timer monitors the facility data link and specifies the maximum time allowed without frames being exchanged on a data link layer connection.

Field 9 *V4 Only*

The field will accept encodes ranging from 0 through 255, which corresponds to 0.1 second per increment for a maximum range of up to 25.5 seconds. The default value for this T200 timer is 10, meaning 1 second. This timer monitors multiple-frame operations on the data link layer.

Field 10 *V4 Only*

This field defines a value for the N200 counter. The value determines the maximum number of frame retransmissions. The permitted range is from 1 through 10, with 3 being the default value.

Field 11 *V4 Only*

This field defines a value for the K counter. The value determines the maximum number of outstanding or unacknowledged information I frames. The range of permitted values is from (1 through 10), with 7 being the default value.

> **NOTE:** Administration values for these procedure 262 timers and counters must be coordinated with the other terminating end.

Procedure 354 Word 3: NPA-NXX Digits Assignment

This word and procedure are used to administer the ISDN numbering plan area (NPA). Depending on the switch configuration, there may be more than one ISDN numbering plan. Contents of these fields make up a part of the station identification number (SID). The SID is transmitted in the calling number IE (part of the setup message) or connect party number (part of the connect message). Figure 7-6, *Procedure 354 Word 3: NPA-NXX Assignment (System 85 R2V4),* depicts procedure 354, word 3.

> **NOTE:** This word need not be translated unless the application requires that SID or the connected number be transmitted to the network.

```
                ENHANCED MODE - PROCEDURE: 354, WORD: 3
                          NPA-NXX ASSIGNMENT

1. NPA-NXX  Designator: [--]
2.                 NPA: [---]
3.                 NXX: [---]
4.    Thousand's Digit: [-]



Connected to CC0 ON-LINE ▽ [MAJOR][MINOR][RUN TAPE][BUSY OUT][IN USE][WAIT]

enter command: _
[        ][        ][F3 DATA][        ][F5 HELP][F6 FIELD][F7 INPUT][F8 CMDS]
```

Figure 7-6. Procedure 354 Word 3: NPA-NXX Assignment (System 85 R2V4)

Field 1 This field should be translated for both private- and public-network connections. The NPA-NXX designator is a 2-digit field and must be within the range of 1 through 99.

Field 2 This 3-digit field should contain the numbering plan area (NPA), which is also called the *area code.* Assignment is therefore dependent on the particular location and application.

Field 3 This 3-digit field should specify the NXX, which is also called the *office code* of the local exchange company (LEC). Permitted values must be those numbers within the range of 200 through 999 and should be the office code of the local exchange.

Field 4 This 1-digit field specifies the thousands digit. When not used, it should contain `(-)`. When used, digits 0 through 9 may be assigned. Use this field only with three-digit dial plans. Do not use it with four- or five-digit dial plans.

Procedure 000 Word 4: NPA-NXX Index Designator

Depending on how the switch is used, procedure 000, word 4, may or may not be translated. Specifically, field 4 of word 4 is used for partitioning, ISDN, or both, and *must be* translated when:

a. The switch transmits the calling party number or connected number to the network

b. The switch provides unique extension number partitions

Field 4 of procedure 000, word 4, need not be translated when the switch does not transmit SID or connected number to the network (public or private).

If the switch contains more than one office code, multiple NPA/NNX designators may be needed.

Figure 7-7, *Procedure 000 Word 4: NPA-NXX Partition Assignment (System 85 R2V4)*, depicts procedure 000, word 4.

```
               ENHANCED MODE - PROCEDURE: 000, WORD: 4
                EXTENSION NPA-NXX/PARTITION ASSIGNMENT

 1.     First Extension: -----
 2.      Last Extension: -----
 3. Extension Partition: ---
 4.  NPA-NXX Designator: --

DISPLAY ONLY
   5. Invalid Extension: -----

Connected to CCO ON-LINE  MAJOR | MINOR | RUN TAPE | BUSY OUT | IN USE | WAIT

enter command: _
 |  | F3 DATA |  | F5 HELP | F6 FIELD | F7 INPUT | F8 CMDS
```

Figure 7-7. Procedure 000 Word 4: NPA-NXX/Partition Assignment (System 85 R2V4)

Field 1 Assigns a single extension number or the first extension number for a block of numbers. The single number or block of numbers will be unique in terms that they relate to a single extension partition identification.

Field 2 Assigns the last extension number for a block of numbers.

Field 3 Assigns the extension partition identification for the tenant services feature.

Field 4 Associates an NPA-NXX Designator with a range of extensions.

Procedure 210 Word 2: LDN, NPA, and NNX Attendant Partition Assignments

This procedure is used to configure the attendant consoles into groups known as *attendant partitions.* Also, listed directory number (LDN) and NPA-NXX assignments are completed, thus relating these assignments to a particular attendant console or attendant partition. Figure 7-8, *Procedure 210 Word 2: Attendant Partition Assignments (System 85 R2V4),* depicts procedure 210, word 2.

```
ENHANCED MODE - PROCEDURE: 210, WORD: 2
CONSOLE ASSIGNMENTS - ATTENDANT PARTITIONS

1.      Console Number: --
2. Attendant Partition: --
3.             Control: -
4.                 LDN: -----
5.  NPA-NXX Designator: --

Connected to CC0 ON-LINE  MAJOR  MINOR  RUN TAPE  BUSY OUT  IN USE  WAIT

enter command:
            F3 DATA      F5 HELP  F6 FIELD  F7 INPUT  F8 CMDS
```

Figure 7-8. Procedure 210 Word 2: Attendant Partition Assignments (System 85 R2V4)

Field 1 Translates a console number. Permitted encodes are any 2-digit number within the range of 1 through 40.

NOTE: The console must have previously been assigned in procedure 210, word 1.

Field 2 Assigns the attendant partition number. Permitted encodes are any unused number within the range of 0 through 40.

Field 3 Assigns the one console in the attendant partition that will be the controlling console. All other members of this group must have control denied. Field encodes and their descriptions are:

0 For all but the controlling console

1 Only for the controlling console.

Field 4 Assigns or associate the LDN with a particular console or console partition. This number depends on the switch or private network numbering plan.

Field 5 Assigns or associate the NPA-NNX designator with the console. The encode must have been previously defined in procedure 354, word 3.

Procedure 010 Word 4: Line Side (B-Channel) BC and ISDN Routing Options

Figure 7-9, *Procedure 010 Word 4: Terminal COS Restrictions (System 85 R2V4),* depicts proceure 010, word 4.

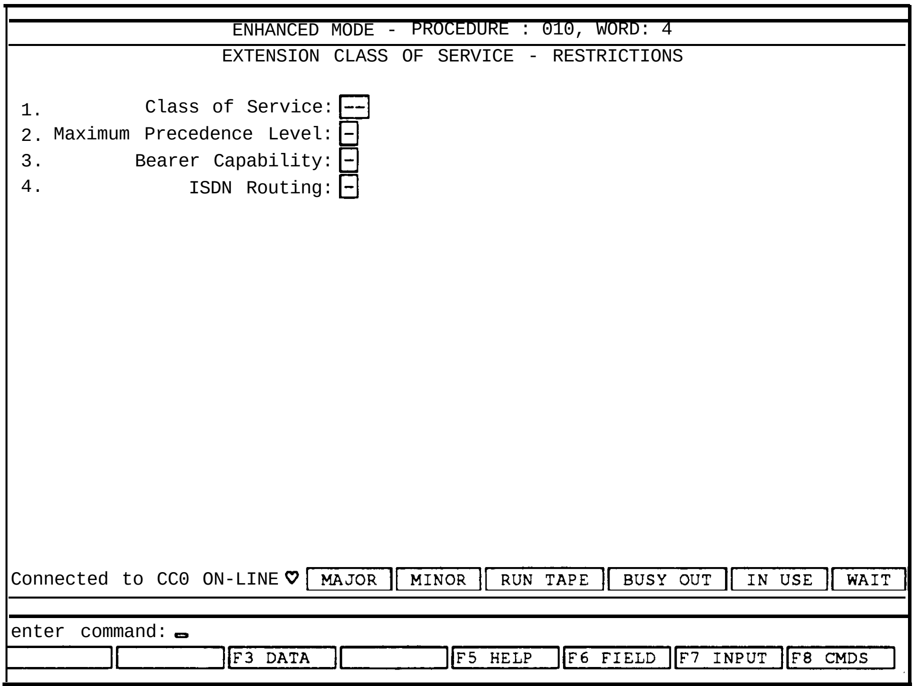


Figure 7-9. Procedure 010 Word 4: Terminal COS Restrictions (System 85 R2V4)

Field 1 When ISDN is administered, each COS assignment must have an associated BC and ISDN routing assignment. That is to say that whenever ISDN is enabled, all COS assignments must also be translated for this procedure. COS assignments must be within the 2-digit range of 1 through 63.

Field 2 This field's encodes are only useful for AUTOVON applications. Dash (-) is appropriate for ISDN applications.

Field 3 This field is used to populate the BC code IE or an ISDN-PRI facility. All endpoints (such as analog lines and DCP voice terminals) must show their information transfer requirements in terms of a BC code. The BC code is the mechanism by which specialized routing is provided for various categories of calls.

NOTE: Once the BC code is assigned, it is fixed and does not change with different calls.

Field encodes and their descriptions are:

0 Voice and Voice-grade data

1 Mode 1 data (56K-bps)

2 Mode 2 data (subrate up to 19.2K-bps)

3 Mode 3 data (also called packet mode)

4 Mode 0 data (64K-bps digital data).

Field 4 This field is used to populate part of the TCM IE and shows an ISDN-PRI Routing option. Field encodes and their descriptions are:

0 For when any type of trunking facility is OK. This option should be used when there are no specific requirements for ISDN-PRI trunks. Generally, this will include all voice and voice-grade data applications (BC code = 0) except those where user-to-user information transfer is desired.

1 When ISDN-PRI trunking facilities are required. Generally, these applications include those COS groups established for Mode 1 data (BC code = 1), Mode 3 data (BC code = 3), and Mode 0 data (BC code = 4).

Mode 0 data, depending on its origin, may require a unrestricted channel. Recall that an unrestricted channel is only provided by those ISDN-PRI facilities that use the B8ZS line-coding format.

2 When any trunking facility will work but when ISDN-PRI trunk facilities are preferred. This may include voice and voice-grade data (BC code = 0) and Mode 2 data (BC code = 2).

Procedure 100 Word 1: Trunk Group Type, Signaling, and Dial Access (ID) Code

Translating word 1 is the first step in establishing trunk groups. Those trunk groups established for ISDN applications may be of the same design as those for non-ISDN applications, except for the type of signaling used. Or, they may (optionally) be designed to take maximum advantage of the ISDN capabilities. Figure 7-10, *Procedure 100 Word 1: Trunk Group Translations (System 85 R2V4)*, shows procedure 100, word 1.

```
ENHANCED MODE — PROCEDURE: 100, WORD: 1
TRUNK GROUP TRANSLATION

1. Trunk Group: [---]

DIAL ACCESS CODE/TRUNK ID CODE
  2. Digit 1: [--]
  3. Digit 2: [-]
  4. Digit 3: [-]
  5. Digit 4: [-]

6. Trunk Type: [---]
7.    Dial Access Restriction: [-]
8. Personal CO Line Appearance: [-]

DISPLAY ONLY
  9. Signaling Type: [---]

Connected to CC0 ON-LINE [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-10. Procedure 100 Word 1: Trunk Group Translations (System 85 R2V4)

Field 1 Assigns a trunk group number. Permitted entries are any unused number from 18 through 999.

Field 2 Assigns the first digit of the trunk access code. Permitted entries are 0 through 9 for digits 0 through 9 and with 11 and 12 for the symbols * and #, respectively.

Field 3 Assigns the second digit of the trunk access code. Permitted entries are 0 through 9.

Field 4 Assigns the third digit of the trunk access code. Permitted entries are 0 through 9.

Field 5 Assigns the fourth digit of the trunk access code. Permitted entries are 0 through 9.

Field 6 Defines the trunk type of a specific trunk group. The ISDN-PRI facility may be used to support several different trunk types. These may include both conventional and the ISDN-dynamic trunk types. An important point to remember is that the service application (such as MEGACOM, MEGACOM 800, or SDN) and incoming digits are the primary determining factors controlling which trunk type is selected.

To date, trunk type 41, 42, or 43 have been the trunk types used most frequently to support all ISDN applications, including CBC.

Incoming ISDN dynamic trunk type 120 calls (to a System 85) may or may not specify an NSF. Generally, incoming calls from the public network will specify an NSF while calls from the private network will not specify an NSF. For example, if the NSF is delivered and it shows an SDN call, then the System 85 defaults to trunk type 46. For all other incoming NSF values, the switch will default to trunk type 30. For those incoming calls which do not deliver an NSF the switch will either use those interface endpoint trunks that are translated in procedure 116 or use a default that is dependent on the type call. For example, trunk type 41 is the default for switch-to-switch connections, trunk type 30 is the default for public network-to-switch connections, and trunk type 108 is the default for host-to-switch calls.

Table 7-2, *Trunks Supporting Signaling Type 20,* shows permitted field entries that support signaling type 20.

TABLE 7-2. Trunks Supporting Signaling Type 20

Trunk Description	Trunk Type
CO	16, *17 (Note 1), 18, 19, 20
Data	100—107
DID	*30, *31
DMI (Note 2)	*108, *109
FX	21—25
ISDN	120 (Note 3)
M/S TIE	70—78
Special	2, 5, 6, 50—58, 62, 65—67, 90—93
TIE	32—40, *41, *42, *43, 44, 45, *46, *47
WATS	26, *27, 28

NOTES:

1. Trunk types preceded with an asterisk (*) may be selected by trunk type 120 on an as needed Call-By-Call (CBC) Service Selection basis.
2. Trunk types not included in these categories may not be translated for ISDN-PRI service. Most conventional trunk types specify, as a part of their name, an in/out signaling sequence. Actually, these signaling sequences are disabled and type 20 signaling is used exclusively over ISDN facilities.
3. Beginning with the 1.0 software load of Generic 2 and the 1.2 software load of System 85 R2V4 digits may be inferred when using the ISDN-dynamic trunk type. The default of 30 infers DID (if necessary). A default of 46 infers AAR/ARS. (See Appendix C, “Administrative Procedure Summary,” for a complete explanation of this field.)

For ISDN trunk groups as well as other types of trunk groups, the entered type defines feature operation for the trunk group. For example, if a trunk group is assigned the type of 19, incoming calls over this trunk group are routed to the attendant console. On DID trunk type groups, the switch expects station number digits on all incoming trunks; on tie trunk type groups the switch can handle either station number digits or network numbers.

For an ISDN trunk group, a dynamic trunk type (120) can be assigned to the group. This trunk type allows the group to process calls with a different trunk type on a call by call basis. For example, one incoming call over the group may expect station number digits (as does a MEGACOM call), while the next call over the group may expect a network number (as does an SDN call). *

Both an AAR/ARS prefix digit (procedure 103) and a DID additional digit (procedure 101) can be administered for ISDN dynamic trunk groups. (This cannot be done for any other type of trunk group.) The dynamic trunk type may be used for CBC service although any of the conventional trunk types could also be used if incoming digits have been provisioned consistently. For example, trunk type 41 could be used as a CBC trunk group to support MEGACOM, MEGACOM 800, and SDN if the incoming digits (for both MEGACOM 800 and SDN) reflect extension numbers or seven digit RNX-XXXX numbers. Customers can choose between 0 and 7 incoming digits to a switch.

Field 7 Assigns the dial access code restriction. Field encodes and their descriptions are:

- `0` Allows access to the trunk group via a dial access code.
- `1` Restricts and only allows access to the trunk group for trunk testing and for providing unattended console service.

Field 8 Assigns the trunk group as a MFT CO line appearance. For the ISDN application, encode `(0)` is applied.

Field 9 Displays default signaling and verify that the type of trunk signaling is correct. The ISDN feature uses message-oriented signaling. Therefore, encode 20 should be used. If the trunk signaling is not as desired — then it may be changed with field 2 of word 3.

Procedure 100 Word 2: Trunk Group Data Translations

This word is used to administer data characteristics for each trunk group. The ISDN feature does not place any new or additional requirements or restriction on the use of this procedure. Selecting the appropriate translations requires the same basic considerations as previously. Therefore, a description for this procedure’s fields is not provided. Figure 7-11, *Procedure 100 Word 2: Trunk Group Data Characteristics (System 85 R2V4),* depicts procedure 100, word 2.

```
                ENHANCED MODE — PROCEDURE: 100, WORD: 2
                  TRUNK GROUPS — DATA AND MODEM POOLING

 1. Trunk Group: [---]                    MODEM POOLING
                                            13. Originate  Mode: [-]
DATA RATE                                   14.    Answer  Mode: [-]
   2. 64000 bps: [-]                        15.     Modem  Type: [-]
   3. 56000 bps: [-]                        16.           Clock: [-]
   4. 19200 bps: [-]                        17.    First Choice: [-]
   5.  9600 bps: [-]
   6.  4800 bps: [-]                      18.         Test Type: [--]
   7.  2400 bps: [-]                      19. Host Access Clock: [-]
   8.  1200 bps: [-]
   9.   300 bps: [-]
  10.       Low: [-]

11. Synchronous: [-]
12.      Duplex: [-]


Connected to CC0 ON-LINE [MAJOR][MINOR][RUN TAPE][BUSY OUT][IN USE][WAIT]

enter command: _
[      ][      ][F3 DATA][      ][F5 HELP][F6 FIELD][F7 INPUT][F8 CMDS]
```

Figure 7-11. Procedure 100 Word 2: Trunk Group Data Characteristics (System 85 R2V4)

Procedure 100 Word 3: ISDN Trunk Group Signaling Options

With System 85 R2V4, the two attributes (trunk type and signaling type) are separated and translated as individual parameters. Figure 7-12, *Procedure 100 Word 3: Trunk Group/Trunk Type — Signaling Type Translations (System 85 R2V4)*, depicts the procedure for translating the signaling type and associating that attribute to a particular trunk group or trunk type.

```
ENHANCED MODE — PROCEDURE: 100, WORD: 3
TRUNK GROUPS — SIGNALING AND OTHER PARAMETERS

1.      Trunk Group: [---]
2. Signaling Type: [---]
3.          Glare: [-]
4.          Retry: [-]
5. Outgoing Maintenance Busy Out Seizure: [-]
6.            Incoming Permanent Seizure: [-]
7.                     Failure Threshold: [--]
8.  Optional ISDN Information Inhibited: [-]
9.                 Network Service Value: [---]

DISPLAY ONLY
  10. Trunk Type: [---]

Connnected to CC0 ON-LINE [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[      ] [      ] [F3 DATA] [      ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-12. Procedure 100 Word 3: Trunk Group/Trunk Type — Signaling Type Translations (System 85 R2V4)

Field 1 Specifies a trunk group. Permitted entries include any not already used number within the range of 18 to 999.

Field 2 Administers or changes the signaling type for the trunk group.

Field 3 For all ISDN trunking applications except DCS, glare is resolved by the ISDN protocol. Glare is discussed in more detail in chapter 2, *Network Connections and Configurations.* Specifically, ISDN negotiates the losing call to a different channel if the original channel is preferred. Exclusive calls (such as DCS) are not negotiated and the user hears the reorder tone. In either case, the network interface has priority over the user interface when both calls are preferred or exclusive. This capability is administered in procedure 262, word 1, and field 5. Therefore, this field 3 entry may be any of the available encodes (0, 1, or 2) since this field is ignored for ISDN applications.

Field 4 Retry permits multiple attempts to seize a busy trunk from the specified trunk group.

This field is primarily applicable for those trunk groups routed over analog facilities and use one of the following trunk types: 41, 42, 43, 46, or 47. Depending on the particular configuration, RETRY may or may not be applicable for ISDN applications. Field encodes and their descriptions are:

- 0 When multiple retry is not desired RETRY NOT ACTIVE. The ISDN-PRI protocol contains retry capability. When signaling type 20 is selected, 0 encode is required.
- 1 Recommended for ISDN applications where the 40-series of trunk types is used. Encode 1 enables a double retry and thus provides slightly improved call completion, particulary for large trunk groups that span across more than one transmission facility.

Field 5 Not applicable for ISDN applications. Therefore, the required option must be 0 for not active.

Field 6 Not applicable for ISDN applications. Therefore, the required option must be 0 for not active.

Field 7 Not applicable for ISDN applications. Therefore, the required option must be 0 for no failure threshold. See field 17 of procedure 107, word 5, for related information.

NOTE: This field is only applicable for analog trunk facilities. It permits the user to establish a trunk failure threshold that, when exceeded, will generate an alarm. The threshold limit will affect service availability and, on an indirect basis, the customer’s maintenance costs.

Field 8 Selects whether the optional ISDN information is transmitted and access to other ISDN network features is desired.

The optional ISDN IEs include the following:

- Calling number display
- *Connected party number
- *User-to-user information
- *Called party name
- *Calling party name
- *Data mode 3 parameters
- *Traveling class marks

> **NOTE:** Those items identified with an asterisk (*) can only be passed through the ISDN public network, on an end-to-end basis, whenever all interoffice signaling links use CCITT signaling system number 7 (SS7).

Field encodes and their descriptions are:

- (Dash) only applicable whenever ISDN is not available

0 Recommended for all ISDN configurations, both public and private network arrangements.

1 When the optional ISDN IEs are not to be transmitted.

Field 9 A CBC function used in conjunction with trunk verification by station (TVS) which specifies the requested network service. The following table shows permitted field entries that support signaling type 20.

Trunks Supporting Signaling Type 20

Trunk Description	Trunk Type
CO	16, *17 (Note 1), 18, 19, 20
Data	100—107
DID	*30, *31
DMI (Note 2)	*108, *109
FX	21—25
ISDN	120 (Note 3)
M/S TIE	70—78
Special	2, 5, 6, 50—58, 62, 65—67, 90—93
TIE	32—40, *41, *42, *43, 44, 45, *46, *47
WATS	26, *27, 28

NOTES:

1. Trunk types preceded with an asterisk (*) may be selected by trunk type 120 on an as needed Call-By-Call (CBC) Service Selection basis.
2. Trunk types not included in these categories may not be translated for ISDN-PRI service. Most conventional trunk types specify, as a part of their name, an in/out signaling sequence for default signaling types. Actually, these signaling sequences are disabled and type 20 signaling is used exclusively over ISDN facilities.
3. Beginning with the 1.0 software load of Generic 2 and the 1.2 software load of System 85 R2V4 digits may be inferred when using the ISDN-dynamic trunk type. The default of 30 infers DID (if necessary). A default of 46 infers AAR/ARS. (See Appendix C, "Administrative Procedure Summary," for a complete explanation of this field.)

Field 10 Used as a display-only field. The field displays the trunk type that was administered in procedure 100, word 1.

Procedure 101 Word 1: ISDN Trunk Group, CDR, Digital Loss Plan, and AVD Assignments

Procedure 101, word 1, is used primarily to start CDR, as well as translate the digital loss plan and AVD options. Figure 7-13, *Procedure 101 Word 1: Additional Trunk Group Translations (System 85 R2V4)*, depicts this procedure.

```
              ENHANCED MODE — PROCEDURE: 101, WORD: 1
                    TRUNK GROUP CHARACTERISTICS

1.          Trunk Group: [---]            15.  APLT Features Allowed: [-]
2. Balance: [-]                           16. Disconnect  Supervision: [-]
3.     Battery Reversal: [-]              17. AVD: [-]
4. Incoming Prefix Digit: [-]
5. DCS: [-]
6.        Touch-Tone In: [-]
7.       Touch-Tone Out: [-]
8.           CDR Active: [-]
9.   AIOD Billing Number: [----]

TIMED RECALL
  10.  Time: [--]
  11. Level: [-]

12.     CDR Variable Timer: [--]
13. Pad Group: [-]
14. Tie Toll: [-]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-13. Procedure 101 Word 1: Additional Trunk Group Translations (System 85 R2V4)

Field 1 Displays the trunk group number, such as previously translated in procedure 100.

Field 2 Selects whether the trunk group uses balanced transmission facilities. Field encodes and their descriptions are:

0 Not provided — the required option for ISDN-PRI.

1 Provided — not applicable for ISDN-PRI.

Field 3 Translates the battery reversal option. Field encodes and their descriptions are:

0 Not provided — the required option for ISDN-PRI

1 Provided — not applicable for ISDN-PRI

Field 4 Depending on how each type of DID service is provisioned it may or may not be necessary for the switch to infer (generate) a digit to complete the call. Field encodes and their descriptions are:

- Dash (-) is applicable for all ISDN-PRI applications except DID (trunk types 30, 31, and 120).
- Any single digit number (0 through 9). Which number is determined by the trunk group and its application.

NOTE: When using System 85 R2V4 1.1 software, digits cannot be inferred for ISDN-dynamic trunk types.

Field 5 Assigns whether the trunk group is (1) or is not (0) used for DCS applications.

Fields 6-7 Selects in/out touch-tone availability. Field encodes and their descriptions are:

0 When only rotary pulses are received via the trunk group

1 When either rotary pulses or tough-tone can be accepted

> **NOTE:** The ISDN-PRI applications use the D-channel to transmit and receive dialed digits. Dialed digits are transmitted as ASCII characters. Therefore, for ISDN applications, this field is ignored; either option may be translated.

Field 8 Assigns the trunk group to CDR record keeping. Field encodes and their descriptions are:

0 Trunk group usage not applicable for CDR recording

1 Trunk group usage will be recorded by CDR

2 Trunk group usage will be recorded, account code is required

Fields 9-11 Not used for ISDN applications.

Field 12 This field is only applicable when CDR is being used, and then only to change the default CDR timer value. Field encodes represent intervals in l-second increments. The range is 1 through 99 with dash (-) being the default timer value of 6 seconds.

Field 13 Administers the optional transmission loss assignments. The encode translated depends on the network configuration and service application. However, the default (0) setting should always be used unless an NEC engineer is consulted. (Chapter 4, *The Digital Loss Plan*, describes the digital loss plan and table 4-2, *Digital Loss Plan (Port-to-Port Losses),* in this same chapter lists port-to-port loss values.)

Field encodes and their corresponding loss plan are listed as follows:

0 (default) The Digital Fixed Loss Plan

Always use this setting unless you consult an NEC engineer.

1 ISL Tie Trunk

2 EIA Tie Trunk

> **NOTE:** This option is recommended for Special Access Connections to a 4ESS.

3 ISL Digital Central Office

4 EIA Digital Central Office

5 Digital Toll Office

6 Analog Toll Office

7 AUTOPLEX NETWORK Interface V

8 AUTOPLEX NETWORK Interface Y *

Field 14 Assigns whether a trunk is toll restricted (1) or unrestricted (0).

> **NOTE:** This field is ignored by the ISDN software. Either encode is satisfactory.

Field 15 Advanced Private Line Termination (APLT) services are not applicable in the ISDN-PRI environment. Therefore, for trunk groups using ISDN-PRI facilities, this field is ignored. Refer to Appendix C, *Administrative Procedure Summary,* for more information about the dynamic 120 trunk types.

Field encodes and their descriptions are:

- `0` When APLT services are not available for analog or DS1/DMI-BOS facilities
- `1` When APLT services are available for analog or DS1/DMI-BOS facilities.

Field 16 Assigns whether disconnect supervision is `(1)` or is not `(0)` provided.

NOTE: The ISDN-PRI protocol provides disconnect supervision. Therefore, this field is ignored by ISDN software.

Field 17 *V4 Only*

Assigns whether the trunk group may be used to support modem pool calls. Field encodes and their descriptions are:

- `0` When AVD is not provided (that is, insert a modem). This includes voice and digital data. This option is required for all trunk groups that support modem pool calls including voice and digital data.
- `1` When the AVD option is provided (that is, do not insert a modem).

Procedure 103 Word 1: Trunk Group Digit Collection and Trunk-Side BC

This procedure is used to translate the trunk group network parameters. Figure 7-14, *Procedure 103 Word 1: Network Trunk Group Translations (System 85 R2V4),* depicts procedure 103, word 1.

```
                ENHANCED MODE — PROCEDURE: 103, WORD: 1
                    NETWORK TRUNK GROUP TRANSLATION

1 . Trunk Group:[---]
2 .      Facility Restriction Level: [-]
3 . Network Trunk:[-]
4 . Main/Tandem: [-]
5 . Incoming Tie to AAR/ARS or APLT:[-]
6 .     Authorization Code Required:[-]
7 . Bridge-On Allowed: [-]
8 .         Trunk Reservation Limit: [--]
9 . AAR/ARS Prefix:[-]
10.     Data Protection (Permanent): [-]
11.   Remote Access Echo Suppressor: [-]
12.          AAR Conditional Routing: [-]
13. Second TCM: [-]
14. Digit Collection: [-]
15. Bearer Capability: [-]



Connected to CC0 ON-LINE ♡ [MAJOR][MINOR][RUN TAPE][BUSY OUT][IN USE][WAIT]

enter command: _
[        ][        ][F3 DATA][        ][F5 HELP][F6 FIELD][F7 INPUT][F8 CMDS]
```

Figure 7-14. Procedure 103 Word 1: Network Trunk Group Translations (System 85 R2V4)

Field 1 Displays the trunk group number previously administered in procedures 100 and 101.

Fields 2-13 DS1 or ISDN-PRI do not place any new or additional considerations on translating these fields. The encodes that are translated are generally dependent on each trunk group, its application, and the associated trunk groups. Refer to Appendix C, *Administrative Procedure Summary*, for more information about the dynamic 120 trunk types. For more information see *Dynamic Trunk Type* in *Procedure 100 Word 1*.

Field 14 Specifies how the dialed digits are outpulsed. Field encodes and their descriptions are:

- 0 When digit outpulsing may overlap digit reception
- 1 When all digits must be received before outpulsing may start. All ISDN applications, regardless of the trunk type, require that a (1) be translated in this field. Digit outpulsing does not begin until all digits are received. Then digits are outpulsed as ASCII characters — per the ISDN recommendations.

Field 15 *V4 Only*

Used for non-ISDN trunk groups that interwork to ISDN trunk groups. Therefore, field 15 only applies to non-ISDN trunk groups. Generally, trunk groups can use both analog and ISDN-PRI (digital) transmission facilities. Any restrictions and compatibility requirements are conveyed as information known as the *BC code*. This field is used to populate the BC IE. Field encodes and their descriptions are:

- 0 Voice and Voice-grade data
- 1 Mode 1 data (56K-bps)
- 2 Mode 2 data (subrate up to 19.2K-bps)
- 3 Mode 3 data (also called packet mode)
- 4 Mode 0 data (64K-bps digital data)

Procedure 116 Word 1: DS1/DMI/ISDN-PRI Trunk Assignments

Each analog trunk circuit pack provides four circuits that are administered by using procedure 150. Conversely, each DS1 provides 24 circuits (channels) that are administered by using procedure 116. Figure 7-15, *Procedure 116 Word 1: DS1 Trunk Assignments to Equipment/Circuit Location (System 85 R2V4)*, depicts procedure 116, word 1. Each DS1/MFAT carrier will support a maximum of two DS1s, each occupying one slot and located in slots 5 and 18. When a DS1/DMI/ISDN interface (trunk applications) is located in slot 5, it uses the six slots 0, 1, 2, 5, 6, and 7. When the interface is located in slot 18, it uses the six slots 13, 14, 15, 18, 19, and 20.

```
                    ENHANCED MODE — PROCEDUURE: 116, WORD: 1
                          DS1 AND ISDN TRUNK ASSIGNMENTS

EQUIPMENT LOCATION
   1 .  Module: --
   2 . Cabinet: -
   3 . Carrier: -
   4 .    Slot: --
   5 . Circuit: --

6 .          Trunk Group: ---
7 .       Night Terminal: -----
8 .    Disable Signaling: -
9 . AIOD Equipment Number: ----
10.   Interface Endpoint: -

Connected to CC0 ON-LINE  MAJOR | MINOR | RUN TAPE | BUSY OUT | IN USE | WAIT

enter command:
          |          | F3 DATA |          | F5 HELP | F6 FIELD | F7 INPUT | F8 CMDS
```

Figure 7-15. Procedure 116 Word: 1 DS1 Trunk Assignments to Equipment/Circuit Location (System 85 R2V4)

The DS1 channels are assigned to slot and circuit locations according to the order in which the module processor scans the equipment carrier. The first circuit scanned is circuit 0 of slot 05 (or 18); the second is circuit 0 of slot 06 (or 19); the third is circuit 0 of slot 7 (or 20); and the fourth is circuit 1 of slot 05 (or 18). Continue in this way to channel 12 that will be located at circuit 3 of slot 07 (or 20); remaining 12 channels are assigned beginning with circuit 0 of slot 0 (or 13). Continue in this way through channels 23 or 24, depending on whether robbed-bit or 24th-channel signaling is translated; refer to table 7-3, *DS1/ISDN-PRI Administration — Channel Versus Trunk Assignments.*

TABLE 7-3. DS1/ISDN-PRI Administration — Channel Versus Trunk Assignments

DS1 Channel	Slot/Circuit	DS1 Channel	Slot/Circuit
1	*/0	13	*+1/0
2	*/1	14	*+1/1
3	*/2	15	*+1/2
4	*/3	16	*+1/3
5	*/4	17	*+1/4
6	*/5	18	*+1/5
7	*/6	19	*+1/6
8	*/7	20	*+1/7
9	*/8	21	*+1/8
10	*/9	22	*+1/9
11	*/10	23	*+1/10
12	*/11	24	*+1/11

LEGEND:

* Any slot for the TN767 except slot number one in the universal port carrier.

*+1 The slot next to the TN767 or TN555.

NOTE: Channel 24 is the D-channel.

NOTE: When the equipment carrier is configured with two DS1s, physical slots 3, 8, 16, and 21 are available for other applications. If only one DS1 is configured, then six additional slots are available for other applications.

To minimize confusion and eliminate the need for maintaining elaborate trunk to channel cross-reference tables, trunk group member assignments should match the DS1 channel assignments (for example, trunk group member 1 should be on channel 1). When using procedure 116, word 1, refer to Table 7-2, *Trunks Supporting Signaling Type 20,* to determine which slot and circuit to translate for channel 1. Repeat this procedure by sequentially selecting DS1 channels (2, 3, and so on) and translating the appropriate slot and circuits as required.

Fields 1-5 These fields are used to translate the equipment location, including slot and circuit (channel) location, and to associate the equipment location (channel) with the particular trunk group translated in field 6.

Field 6 Translates the trunk group. Permitted encodes must be numbers with the range of 18 through 999.

Field 7 Translates a particular number that functions as the night service number. The number of digits depend on the particular application and its numbering plan.

Field 8 Disables a channel's signaling. Field encodes and their descriptions are:

- `-` (Dash) used when ISDN is enabled.
- `0` Used when signaling is enabled. This is the default option (not used with ISDN).
- `1` Used when signaling is disabled. Use this with dedicated switched connection to disable signaling for a tie trunk. The signaling bit then can be used as a data bit, allowing the full 64K-bps to be used for data.

Field 9 Not applicable for ISDN-PRI.

Field 10 For outgoing AAR and TVS test calls, this field determines the encoding of the called party IE as assigned in procedure 107, word 1, and procedure 108, word 1. If the B-channel is in an ISDN dynamic trunk group, this field also determines how an incoming call over the trunk is processed (see the *Procedure 100 Word 1* section earlier in this chapter).

See Appendix C, *Administrative Procedure Summary*, for a discussion of the called party IE and the *Procedure 107 Word 1* and *Procedure 108 Word 1* sections in this chapter for more information. Field encodes and their descriptions are:

- `0` For another customer premises switch
- `1` For a private network connection to a host computer
- `2` For public network connections

Procedure 012 Word 1: Name Database

The name database is used by those features (such as DCS, ISDN-PRI) which provide display type information to voice terminals. Some examples of the more common display information include; calling party name, vector directory number, and trunk group name. For ISDN-PRI applications, the name database information is used to populate the display IE in the call setup and connect messages. Figure 7-16, *Procedure 012 Word 1: Name Database Establish Key (System 85 R2V4)*, depicts the first of three related procedures.

```
                 ENHANCED MODE — PROCEDURE: 012, WORD: 1
                   NAME DATABASE — NAME TO BE DISPLAYED

 1. Extension, VDN, or Trunk Group: [-----]
 2.                          Type: [-]
 3.                 Display Start: [--]
 4. Outgoing  Trunk  Display: [-]
 5.                     Copy Mode: [-]
 6. Extension, VDN, or Trunk Group to Copy or Share: [-----]

DISPLAY ONLY
   7.                           Characters In Name: [--]
   8. Shared Primary Extensions or Trunk Groups: [--]
   9.           Associated Extension Name Assigned: [-]

Connected to CC0 ON-LINE [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-16. Procedure 012 Word 1: Name Database Establish Key (System 85 R2V4)

Field 1 Assigns either an extension number, vector directory number, or trunk group. Field encodes and their descriptions are:

- 000 through 99999, for extension and directory numbers

  NOTE: Whether the number is three, four, or five digits depends on the numbering plan.

- 18 through 999, for trunk group numbers

Field 2 Assigns whether the encode for field 1 is a trunk group or extension/vector directory number. Field encodes and their descriptions are:

0 For trunk groups

1 For extension numbers and vector directory numbers

Field 3 This field is only applicable for the identified extension's display module. It controls the number of blank spaces that are inserted before the first displayed character of the name, dialed number, or trunk group name. Permitted encodes are numbers 1 through 30.

Field 4 The main function of this field is to provide some administration control over what is displayed on the voice terminals digital display. Field encodes and their descriptions are:

- (Dash) for all incoming only trunk groups.

0 Used when the user (extension) does not want the outgoing trunk group name displayed but does desire the dialed number to remain on the display.

1 Used when the user desires to display the name of the outgoing trunk group (such as ISDN/SDN, MEGACOM, or CBC).

NOTE: For a tandem interworking call, the name of the incoming trunk group is transmitted in the display IE of the ISDN-PRI outgoing trunk group.

Field 5 The method that defines the name. Field encodes and their descriptions are:

0 Used for adding a new name or changing an existing name; requires that the name change be made with word 2.

1 Used for copying the name from the extension or trunk group that is displayed in field 6

Field 6 This field is used with field 5 to copy an existing name to the extension or trunk group identified in field 1. Field encodes and their descriptions are:

- 000 through 99999, for extension and directory numbers

NOTE: Whether the number is three, four, or five digits depends on the numbering plan.

- 18 through 999, for trunk group numbers

Procedure 012 Word 2: Name Database

This word is used to translate a name (up to a maximum of 30 characters). Figure 7-17, *Procedure 012 Word 2: Name Database Entry (System 85 R2V4)*, depicts this procedure.

```
                ENHANCED MODE — PROCEDURE: 012, WORD: 2
                        NAME DATABASE - ENTRY

 1. Segment: [-]

CHARACTER ENCODES
   2.  Character  1: [--]
   3.  Character  2: [--]
   4.  Character  3: [--]
   5.  Character  4: [--]
   6.  Character  5: [--]
   7.  Character  6: [--]
   8.  Character  7: [--]
   9.  Character  8: [--]
  10.  Character  9: [--]
  11. Character  10: [--]

Connected to CC0 ON-LINE ▽ [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[        ] [        ] [F3 DATA] [        ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-17. Procedure 012 Word 2: Name Database Entry (System 85 R2V4)

Field 1 Identifies one-of-three 10-character fields. Field encodes and their descriptions are:

1 Used for characters 1 through 10

2 Used for characters 11 through 20

3 Used for characters 21 through 30

There exists 94 different encodes (00-12, 14, 15, 17-96) which correspond to numbers 0 through 9, lower case letters, upper case letters, and special characters. The Manager II help screen or the document *AT&T System 85 Release 2 Version 4 Administration Procedures* (555-103-506) may be used for determining the desired encodes.

Fields 2-11 Each field should be translated with the encode that corresponds to the desired character.

Procedure 012 Word 3: Name Database

Since the name database has the potential to use a large amount of memory it is generally desirable to run the compact operation whenever all names have been added. Figure 7-18, *Procedure 012 Word* 3: *Name Database (System 85 R2V4),* depicts this procedure.

```
                    ENHANCED MODE — PROCEDURE: 012, WORD: 3
                          NAME DATABASE COMPACTION

 1. Compact: [-]

DISPLAY ONLY
   2.    Names That Can Yet Be Assigned: [-----]
   3.                   Words Available: [------]
   4. Words to Be Gained by Compacting: [------]










Connected to CC0 ON-LINE ♡ [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[        ] [        ] [F3 DATA] [        ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-18. Procedure 012 Word 3: Name Database (System 85 R2V4)

Field 1 Assigns whether `(1)` or not `(-)` to compact the name database.

Fields 2-4 Are display only and serve to show status of the database.

Procedure 309 Word 1: ARS Assignments and IXC/ISDN Network Identifier

This procedure is used for translating/controlling the Automatic Route Selection feature. Figure 7-19, *Procedure 309 Word 1: ARS (System 85 R2V4),* depicts this procedure.

```
               ENHANCED MODE — PROCEDURE: 309, WORD: 1
                          ARS - ROUTE TABLES

 1.                         ARS Plan: -
 2.                   Pattern Number: --
 3.                Preference Number: --
 4.                      Trunk Group: ---
 5.        Facility Restriction Level: -
 6.                     Warning Tone: -
 7.          Distant Area Code (NPA): ---
 8.                 Send 1 For Toll: -
 9.                 Toll Table Index: --
10.         Number of Digits Deleted: -
11. Digit Collect (DC) Signal Ignore: -
12.       IXC ISDN Network Identifier: ---

Connected to CC0 ON-LINE  MAJOR | MINOR | RUN TAPE | BUSY OUT | IN USE | WAIT

enter command:
 |  | F3 DATA |  | F5 HELP | F6 FIELD | F7 INPUT | F8 CMDS
```

Figure 7-19. Procedure 309 Word 1: ARS (System 85 R2V4)

Fields 1-11 The ISDN-PRI does not place any new or additional considerations on translating these fields. The codes/digits translated are generally dependent on each ARS plan and other switch/network considerations.

Field 12 Specifies either the number (designation) of the interexchange carrier (IXC) or the ISDN Network Service Identifier for the trunk group. The IXC/ISDN network identifier enables the switch to provide equal access capability by populating either the NSF IE or the Transit Network Selection IE. If sending an NSF IE and a particular IXC vendor number is specified in this field, that entry is included in the NSF IE. If no IXC vendor number is specified, an is created automatically in the Transit Network Selection IE. Permitted field entries may be any number within the range of 0 through 999.

When the trunk group is routed over private network ISDN-PRI transmission facilities, then no IXC/ISDN network is used and the 0 option must be translated.

Each network provider (of ISDN service) will have a different IXC identifier number. When connecting to AT&T ISDN network facilities, the required number is 288.

Procedure 309 Word 5: ARS and ISDN Trunk — Network Characteristics

This procedure is required for translating ISDN trunk groups into the ARS plan. Figure 7-20, *Procedure 309 Word 5: ARS and Transit Network Identifiers (System 85 R2V4),* depicts this procedure.

```
                    ENHANCED MODE — PROCEDURE: 309, WORD: 5
                      ARS — ISDN AND BEARER CAPABILITY COS

1. ARS Plan:[-]
2.          Pattern Number:[--]
3.       Preference Number:[--]
4. ISDN Dynamic Trunk Type:[---]
5.    Network Service Value:[---]

BEARER CAPABILITY
  6. Voice or Voice Grade:[-]
  7.          Mode 1 Data:[-]
  8.          Mode 2 Data:[-]
  9.          Mode 3 Data:[-]
 10.          Mode 0 Data:[-]

Connected to CC0 ON-LINE ♡ [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: ▬
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-20. Procedure 309 Word 5: ARS and Transit Network Identifiers (System 85 R2V4)

Fields 1-3 The ISDN-PRI does not place any new or additional considerations on translating these fields. The codes/digits translated are generally dependent on each ARS plan and other switch or network considerations.

Field 4 Translates ISDN trunk type 120 only. Recall that for ISDN applications the trunk type may be translated as fixed (that is, one specific type) or dynamic (which may include those from the fixed category). Generally, the trunk type selected will depend on the network service or feature value, which is translated in field 5. Table 7-4, *Network Service/Feature Options,* shows the relationships.

TABLE 7-4. Network Service/Feature Options

Network Service (or) Network Feature	Network Value	ISDN Trunk Type
OUTWATS Banded (Note 1)	33-288	(Note 2)
Operator Handled	324	47
Pre-Subscribed Common Carrier Operator	325	47
SDN	352	47
MEGACOM 800 Service (inc. International)	(Note 3)	n/a
MEGACOM Service	354	47
INWATS	355	47
WATS Maximal Subscribed Band	356	47
ACCUNET switched digital service	357	47

NOTES:

1. OUTWATS bands 0 through 255 are assigned sequential numeric values ranging from 33 through 288 (for example, band 0 is network service value 33).
2. Trunk types 26 and 27 (DMI data) may be translated depending on local requirements. *
3. Connection made with procedure 309, word 5. Not available in System 85 R2V4.

Field 5 Specifies the network service that is requested. Refer to Table 7-4, *Network Service/Feature Options,* for the appropriate encode.

Fields 6 through 10 are translated to enable or disable one or more BC codes for the ARS plan — pattern number — preference number.

Field 6 Enables `(1)` or disables `(0)` support for voice or voice-grade data BC code.

Field 7 Enables `(1)` or disables `(0)` support for data mode 1 BC code.

Field 8 Enables `(1)` or disables `(0)` support for data mode 2 BC code.

Field 9 Enables `(1)` or disables `(0)` support for data mode 3 BC code.

Field 10 Enables `(1)` or disables `(0)` support for data mode 0 BC code.

Procedure 321 Word 1: AAR Assignments and IXC/ISDN Network Identifier

This procedure is used for translating/controlling the AAR feature. Figure 7-21, *Procedure 321 Word 1: AAR (System 85 R2V4),* depicts the procedure.

```
                  ENHANCED MODE — PROCEDURE: 321, WORD: 1
                           AAR — ROUTE TABLES

 1.                   Pattern Number: ---
 2.                Preference Number: --
 3.                      Trunk Group: ---
 4.       Facility Restriction Level: -
 5.                     Warning Tone: -
 6.                          Off Net: -
 7.         Number of Digits Deleted: -
 8. Digit Collect (DC) Signal Ignore: -
 9.                     0xxx Allowed: -
10.       IXC ISDN Network Identifier: ---

Connected to CC0 ON-LINE  MAJOR  MINOR  RUN TAPE  BUSY OUT  IN USE  WAIT

enter command:
                F3 DATA          F5 HELP  F6 FIELD  F7 INPUT  F8 CMDS
```

Figure 7-21. Procedure 321 Word 1: AAR (System 85 R2V4)

Fields 1-9 The ISDN-PRI does not place any new or additional considerations on translating these fields. The codes or digits translated are generally dependent on each AAR plan and other switch or network considerations.

See table 7-5, *Administrative Summary,* in procedure 321, word 5, for the relationship between administering field 4 in this word and field 4 in word 5.

Field 10 Specifies either the number (designation) of the interexchange carrier (IXC) or the ISDN Network Service Identifier for the trunk group. The IXC/ISDN network identifier enables the switch to provide equal access capability by populating either the NSF IE or the Transit Network Selection IE. If sending an NSF IE and a particular IXC vendor number is specified in this field, that entry is included in the NSF IE. If no IXC vendor number is specified, an is created automatically in the Transit Network Selection IE. Permitted field entries may be any number within the range of 0 through 999.

When the trunk group is routed over private network ISDN-PRI transmission facilities, then no IXC/ISDN network is used and the 0 option must be translated.

Each network provider (of ISDN service) will have a different IXC identifier number. When connecting to AT&T ISDN network facilities, the required number is 288.

Procedure 321 Word 5: AAR and ISDN Trunk — Network Characteristics

This procedure is used to translate ISDN trunk groups in the AAR plan. Figure 7-22, *Procedure 321 Word 5: AAR and Transit Network Identifiers (System 85 R2V4)*, depicts this procedure.

```
                ENHANCED MODE — PROCEDURE: 321, WORD: 5
                    AAR — ISDN AND BEARER CAPABILITY

 1.         Pattern Number: [---]
 2.      Preference Number: [--]
 3. ISDN Dynamic Trunk Type: [---]
 4.   Network Service Value: [---]

BEARER  CAPABILITY
   5. Voice or Voice Grade: [-]
   6.          Mode 1 Data: [-]
   7.          Mode 2 Data: [-]
   8.          Mode 3 Data: [-]
   9.          Mode 0 Data: [-]

Connected to CC0 ON-LINE [MAJOR][MINOR][RUN TAPE][BUSY OUT][IN USE][WAIT]

enter command: _
[        ][        ][F3 DATA][        ][F5 HELP][F6 FIELD][F7 INPUT][F8 CMDS]
```

Figure 7-22. Procedure 321 Word 5: AAR and Transit Network Identifiers (System 85 R2V4)

Field 1 Specifies the AAR pattern number. Permitted encodes are 1 through 640.

Field 2 Specifies the AAR preference number. Permitted encodes are sequential numbers within the range of 1 through 16.

Field 3 Translates the ISDN trunk type. Recall that for ISDN applications the trunk type may be translated as fixed (that is, one specific type) or dynamic (which may include those from the fixed category). Generally, the trunk type selected will depend on the network service or feature value, which is translated in field 4. Table 7-4, *Network Service/Feature Options,* shows the relationships.

Field 4 Specifies the network service requested. Refer to table 7-4, *Network Service/Feature Options,* for the appropriate encode. *

Table 7-5, *Administration Summary,* summarizes administration of NSF in word 5, field 4, and IXC in word 1, field 10 (where TNS is *transit network service).*

TABLE 7-5. Administration Summary

Procedure 321		
Word 5 Field 4 (NSF)	**Word 1 Field 10 (IXC)**	**IE Results**
coded	coded	NSF
dash	coded	TNS
coded	dash	NSF
dash	dash	nothing

Fields 5-9 Enables one or more BC codes for the AAR plan — pattern number — preference number.

Field 5 Enables `(1)` or disables `(0)` support for the voice or voice-grade data BC code.

Field 6 Enables `(1)` or disables `(0)` support for the data mode 1 BC code.

Field 7 Enables `(1)` or disables `(0)` support for the data mode 2 BC code.

Field 8 Enables `(1)` or disables `(0)` support for the data mode 3 BC code.

Field 9 Enables `(1)` or disables `(0)` support for the data mode 0 BC code.

Procedure 107 Word 1: ISDN Trunk Verification by Terminal, Attendant, and ATMS

This procedure must be translated to support trunk verification by voice terminal and trunk verification by attendant over ISDN-PRI facilities. Figure 7-23, *Procedure 107 Word 1: ATMS Terminating Test Line Assignment (System 85 R2V4),* depicts this procedure.

```
                    ENHANCED MODE — PROCEDURE: 107, WORD: 1
                    ATMS — TERMINATING TEST LINE ASSIGNMENT

 1.    Trunk Group: [---]
 2. Test Line Type: [--]

TTL TELEPHONE DIGITS
   3.  Digit  1: [-]                    11.  Digit  9: [-]
   4.  Digit  2: [-]                    12.  Digit 10: [-]
   5.  Digit  3: [-]                    13.  Digit 11: [-]
   6.  Digit  4: [-]                    14.  Digit 12: [-]
   7.  Digit  5: [-]                    15.  Digit 13: [-]
   8.  Digit  6: [-]                    16.  Digit 14: [-]
   9.  Digit  7: [-]                    17.  Digit 15: [-]
  10.  Digit  8: [-]                    18.  Digit 16: [-]

DISPLAY ONLY
  19. Trunk Type: [---]


Connected to CC0 ON-LINE a [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]
enter command: _
[      ] [      ] [F3 DATA] [      ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-23. Procedure 107 Word 1: ATMS Terminating Test Line Assignment (System 85 R2V4)

Field 1 Identifies those ISDN-PRI trunk groups accessed by the trunk verification features. Permitted encodes are previously defined trunk group numbers from 18 to 999.

Field 2 Dash (-), is appropriate for voice terminal and attendant console applications. If a transmission test line is used, its type should be specified.

Fields 3-18 Assigns digits for the terminating test line. Procedure 107, words 2-7, need only be translated whenever ATMS is used (or TVS for ISDN).

Procedure 108 Word 1: ISDN Trunk Group Terminating Test Line Number (Digits)

This procedure is used for ISDN-PRI testing purposes with procedure 648 test 3. This procedure translates the line number that identifies the loop around termination for the particular B-channel. This test line number must be assigned for both private and public network configurations. Whether more than one terminating test line number is needed depends on the number of ISDN-PRI links and whether they terminate on more than one switch. Figure 7-24, *Procedure 108 Word 1: ISDN Terminating Test Line Assignments (System 85 R2V4),* depicts this procedure.

```
              ENHANCED MODE — PROCEDURE: 108, WORD: 1
                ISDN TERMINATING TEST LINE ASSIGNMENT

 1. Trunk Group: [---]

TERMINATING TEST LINE TELEPHONE DIGITS
   2. Digit 1: [-]                     10.  Digit 9: [-]
   3. Digit 2: [-]                     11. Digit 10: [-]
   4. Digit 3: [-]                     12. Digit 11: [-]
   5. Digit 4: [-]                     13. Digit 12: [-]
   6. Digit 5: [-]                     14. Digit 13: [-]
   7. Digit 6: [-]                     15. Digit 14: [-]
   8. Digit 7: [-]                     16. Digit 15: [-]
   9. Digit 8: [-]                     17. Digit 16: [-]

DISPLAY ONLY
  18. Trunk Type: [---]

Connected to CC0 ON-LINE [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-24. Procedure 108 Word 1: ISDN Terminating Test Line Assignments (System 85 R2V4)

Field 1 Translates the termination for each trunk group that identifies the ISDN loop around terminating test line. The terminating test line is required for B-channel maintenance testing.

As part of the installation and ISDN-PRI services provisioning process, the terminating test line number assignment must be coordinated with the terminating switch.

Fields 2-17 Assigns digits for the terminating test line.

GENERIC 2

Depending on whether the switch provides private network ISDN service or public network ISDN services, whether the switch functions as an endpoint or as a tandem node, will determine whether other features should be administered before ISDN-PRI. Primarily, these other features include tandem tie trunk access, trunk-to-trunk calling, and miscellaneous trunk restrictions. When applicable, these features are administered with procedures 275, word 1, 110, 111, 102, and 010, word 3.

Procedure 275 Word 4: ISDN Service — Enable/Disable

Screen-based procedure 275 is used to translate the system COS assignments as well as several other miscellaneous services and features. Word 4 provides the capability for enabling and disabling the ISDN service. Figure 7-25, *Procedure 275 Word 4: System COS and Miscellaneous Service Assignments (Generic 2),* depicts this procedure.

```
                     ENHANCED MODE — PROCEDURE: 275, WORD: 4
                           SYSTEM COS — MISCELLANEOUS

 1. Traditional Code Calling Access Digits: [-]
 3.                  Trunk-to-Trunk Transfer: [-]
ATTENDANT RELEASE LOOP OPERATION
  4.             Status: [-]
  5. Timed Recall Timer: [--]
                                             14. ISDN Status: [-]
 6. Default Recent Disconnect Inteval: [---]
MAXIMUM PREEMPTION LEVEL                     ADMINISTRABLE ALARMS
  7. All Incoming: [-]                         15. Even Port Peripherals: [-]
 OUTGOING                                      16.        Trunk Software: [-]
    8.  Terminal: [-]                          17.    Auxiliary Software: [-]
    9. Attendant: [-]                        DISPLAY ONLY
                                               18. Local Switch Number: [---]
10. AUTOVON Interface Switch: [--]
11.  ACD Abandon Call Search: [-]
12.               MLL Status: [-]
13.               CMS Status: [-]

Connected to CC0 ON-LINE ♡ [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[     ] [     ] [F3 DATA] [     ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-25. Procedure 275 Word 4: System COS and Miscellaneous Service Assignments (Generic 2)

Field 14 For Generic 2, field 14 must always be translated. Field encodes and their descriptions are:

- – (Dash) required when ISDN is not provided. Current policy is to always ship ISDN-PRI software with the switch. However, the administration software still provides the option to assign this software as unprovided.
- 0 Must be translated when ISDN is provided but disabled.
- 1 Must be translated to enable ISDN service.

Procedure 276 Word 1: Other Feature Groups

Use this procedure to turn on optional networking features such as AAR, DCS, SNC, Look-Ahead Interflow, and Integrated Telemarketing Gateway (ITG) or to see which of these features are turned on. Figure 7-26, *Procedure 276 Word 1: Feature Group COS (Generic 2),* depicts this procedure.

```
                ENHANCED MODE — PROCEDURE: 276, WORD: 1
                    FEATURE GROUP CLASS OF SERVICE

 1.                  Standard Network: -
 2.                      Multipremise: -
 3.                               DCS: -
 4.                           AUTOVON: -
 5.                    Call Vectoring: -
 6.                   Tenant Services: -
 7.                     System 85 SE: -
 9.              Look-Ahead Interflow: -
10.  Integrated Telemarketing Gateway: -

DISPLAY ONLY
  11. Use Procedure: ---

Connected to CC0 ON-LINE  MAJOR  MINOR  RUN TAPE  BUSY OUT  IN USE  WAIT

enter command:
                F3 DATA            F5 HELP  F6 FIELD  F7 INPUT  F8 CMDS
```

Figure 7-26. Procedure 276 Word 1: Feature Group COS (Generic 2)

Procedure 250 Word 1: SC/DS1 — Carrier Designation

This procedure is used to assign the equipment carriers to a module and cabinet. Additionally, it is used to assign the type of carrier, the carrier port electrical number, and whether the carrier is equipped with a TN463 synchronization clock (SC). Figure 7-27, *Procedure 250 Word 1: System Configuration — Carriers (Generic 2),* depicts this procedure.

```
ENHANCED MODE — PROCEDURE: 250, WORD: 1
                                  CARRIERS

CARRIER LOCATION                            LOCAL RMI LOCATION
   1.  Module: [--]                            12.  Module: [--]
   2. Cabinet: [-]                             13. Cabinet: [-]
   3. Carrier: [-]                             14. Carrier: [-]
                                               15.    Slot: [--]
 4. Carrier Type: [--]

MODULE CONTROL
   5.         I/O: [-]
   6.         PDS: [-]
   7. Duplicated:  [-]
   8.         TMS: [-]

 9. Port Electrical Carrier: [--]
10.  TMS Electrical Carrier: [-]
11.            SC Equipped:  [-]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-27. Procedure 250 Word 1: System Configuration — Carriers (Generic 2)

DS1 circuit packs may only be installed within DS1 port carriers. Each Generic 2 that is equipped with one or more DS1s will also contain either a TN463 SC or a TN2131C. For single-module systems, the SC is located in the module control carrier along with the TN460 module clock. For multimodule systems, the SC is located in the TMS carrier.

Fields 1-3 Identifies a module number, cabinet number, and physical carrier position. The appropriate encodes are determined based on whether the module is traditional or universal and the physical equipment location, refer to table 7-6, *Equipment Parameters and Permitted Translation Encodes.*

Field 4 Translates a particular type of carrier (such as DS1/MFAT, module control, or TMS) to the equipment location identified by fields 1-3. For DS1/DMI/ISDN-PRI applications, field encodes and their descriptions are:

- 2 Universal Module Control 0
- 3 Universal Module Control 1
- 4 TMS 0 Control
- 5 TMS 0 Growth
- 6 Traditional Module Control 0
- 7 Traditional Module Control 1
- 8 TMS 1 Control
- 9 TMS 1 Growth
- 10 Universal port
- 11 DS1 port carrier

Depending on whether the purpose for translating this procedure is to assign the SC or to assign a DS1 port carrier will determine which encode to select.

Fields 5-10 DS1/DMI/ISDN-PRI does not place any additional requirements on translating these fields.

Field 11 Field encodes and their descriptions are:

- 0 Translated for external synchronization, when the carrier (which is identified by fields 1-10) is not equipped with an SC.
- 1 When the carrier (module control or TMS) is equipped with an SC.

NOTE: The network synchronization diagram should be available, and is required, to determine how to properly synchronized the switch.

Fields 12-15 Not applicable for DS1/DMI/ISDN-PRI applications. Therefore, a dash (–) is appropriate.

Procedure 260 Word 1: DS1/DMI/ISDN-PRI Physical Interface

Procedure 260 is required to administer each DS1. For traditional modules, the ANN11 circuit pack provides DS1/DMI-BOS services while the ANN35 provides DMI-MOS/ISDN-PRI services. For universal modules, the TN767 circuit pack provides DS1/DMI services while the TN767/TN555 pair provides ISDN-PRI services. Figure 7-28, *Procedure 260 Word 1: Additional DMI-MOS/ISDN-PRI Circuit Pack Assignments (Generic 2),* depicts this procedure.

```
                    ENHANCED MODE — PROCEDURE: 260, WORD: 1
                  DS1/ISDN AND RG CIRCUIT PACK ASSIGNMENTS

EQUIPMENT LOCATION                              SC
   1. Module:    [--]                             12. Equipment Type:  [-]
   2. Cabinet:   [-]                              13. SC Reference:    [-]
   3. Carrier:   [-]
   4. Slot:      [--]                           14. Application:     [--]
                                                15. Bit Inversion:   [-]
SIGNALING                                       16. Link Type:       [-]
   6. Framing:     [-]                          17. SA/FX:           [-]
   7. 23B+D/24B:   [-]                          18. Loop Length:     [-]
   8. 24C/RBS:     [-]                          19. E Bit:           [-]
   9. ZCS/ B8ZS:   [-]

10. Slip Enable:     [-]
11. External Loop:   [-]

DISPLAY ONLY
  20. SC Information:   [--]

Connected to CC0 ON-LINE ♡ [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[        ] [        ] [F3 DATA] [        ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-28. Procedure 260 Word 1: Additional DMI-MOS/ISDN-PRI Circuit Pack Assignments (Generic 2)

Fields 1-4 Assigns the circuit pack to an equipment location. Table 7-6, *Equipment Parameters and Permitted Translation Encodes,* depicts the permitted ranges for these encodes.

TABLE 7-6. Equipment Parameters and Permitted Translation Encodes

Equipment Parameter	Traditional Module	Universal Module
Module Number	0-30	0-30
Cabinet Number	0-7	0
DS1 Carrier ID	0-3	c-e
Slot Numbers (Note 1)		
ISDN-PRI Trunks	5 and 18 (Note 2)	1-19 (Note 3)
Line+Trunk Mode	5 and 18 (Note 2)	1-19 (Note 4)
OPS Line-Only Mode	0, 5, 13, and 18	1-19 (Note 5)

NOTES:

1. The circuit pack application type (Field 14) will to a large degree determine which slots may be used.
2. When a DS1/MFAT carrier is configured with two DS1s, physical slots 3, 8, 16, and 21 are available for other applications. If only one DS1 is configured, then six additional slots are available for other applications.
3. When the slot is used for ISDN-PRI trunk applications the adjacent right slot must be configured with the TN555 circuit pack, except in nonfacility associated signaling (NFAS) arrangements that have no D-channel on this DS1 link.
4. When used for a mixture of lines and trunks (two slots are required) the adjacent right slot must remain vacant.
5. When used for OPS line applications, there is no requirement to leave a vacant slot to the right. Actually, all 19 slots (1 through 19 consecutively) may be used to provide OPS. However, it is still recomended that the slot to the right remain vacant to accommodate future changes.

Field 6 Used for assigning the framing format. The choices are D4 and ESF (previously called F_e).

The choice of framing format is totally dependent on the equipment connected to the interface (such as D4-channel bank, CDM, BCM32000, host computer, and other switches). Normally the format is not dependent on facilities used, but there could be some older digital radio equipment that only supports D4. The ESF format consists of a better framing algorithm and therefore provides more reliable error detection than D4. The ESF is the preferred selection for System 75-to-System 75, System 75-to-Generic 1 or -Generic 2, System 75-to-System 85, System 85-to-System 85, System 85-to-Generic 1 or -Generic 2 T1-spans. The D4 format should be selected for T1-spans connecting D4-channel banks and CDMs since they do not typically support ESF.

Field 7 If field 14 is defined as non-ISDN (0, 1, or 2) this field is equivalent to the Per-Channel Signaling and common channel signaling options used with System 85 R2V4. However, the terms have been changed to facility associated signaling (FAS) and NFAS.

If field 14 is defined as ISDN `(5),` this field is used to specify the method used to construct signaling bits for each DS0 B-channel. The 23B + 1D option is also called FAS. If this interface contains a D-channel (23B + 1D), if it is a DS1/DMI link, or if it is an ISDN-PRI link that transmits B-channel signaling information with that particular DS1 link, assign a `0` here.

If this facility contains all ISDN B-channels (24B), assign a `1` here. The 24B option is also called NFAS. It is required for those ISDN-PRI links that have their B-channel signaling information transmitted over a different ISDN-PRI link. For each ISDN-PRI facility using NFAS, that facility must be translated as part of a D-channel group in procedure 116, word 1. Each D-channel group number must be associated with a particular ISDN-PRI facility that transmits the signaling for all links within the group. The (23B + 1D) ISDN-PRI equipment location that provides this capability is called the *primary D-channel.* Reliability may be increased by administering an alternate (23B + 1D) ISDN-PRI equipment location as the backup D-channel (as administered with procedure 262, word 2).

Field 8 Offers the choice of 24th-channel or RBS. The choice of signaling method used is dependent on the application. The DS1/DMI-BOS applications may be translated for either option. However, non-NFAS ISDN-PRI applications always require that 24th-channel signaling be selected. With NFAS, it is possible that no D-channel exists for this DS1 link.

24th-channel signaling multiplexes all signaling information for channels 1 through 23 into the 24th channel. This makes available the full 64K-bps bandwidth (of channels 1 through 23) for voice and/or digital data transmission.

Field 9 Assigns the line coding format that will be used to forcibly ensure that the data meets T1-carrier ones-density requirement. Field encodes and their descriptions are:

- Zero Code Suppression (ZCS)
- Bipolar 8 Zero Code Suppression (B8ZS).

The ZCS line-coding format (restricted) scans each byte for the all-zeroes octet and, on detecting this bit sequence, substitutes a one for the zero in bit position 2. The ZCS format is the most common and is used widely. The ZCS format can be used (without any consideration of the communications protocol) to transmit 7-bit characters/data at rates up through 56K-bps via modems and multiplexers that do bit-stuffing. If the data communications protocol is based on the high-level data link (HDLC) protocol (that is, mode 2/3) and data is transmitted as inverted-HDLC, then the ZCS option can be used for data rates up through 64K-bps. The data modules (both DCP and BRI) use the DCP protocol and BRI protocol respectively. Both DCP and BRI are based on the null based DMI specification, and therefore meet these requirements.

Those DS1/T1 facilities that use RBS and are optioned for ZCS maintain the ones-density requirement by converting all-zero octets in the transmit PCM stream of each channel to a string of seven zeros and a one. This does not significantly affect voice and voiceband data since it is in analog (PCM) form. For DS1/T1 facilities that use 24th-channel signaling and are optioned for ZCS, the data communications protocol/communications equipment used must prevent the all-zeroes octet from occurring; otherwise, the ZCS method will forcibly alter the data (causing errors) to guarantee proper ones-density.

The B8ZS line-coding format (unrestricted) substitutes a unique code (bipolar violation code) for any eight consecutive zeros. This bipolar violation code is detected at the receiving end and converted back to the original string of eight zeros. The B8ZS encoding method permits data transmission at rates up through 64K-bps without consideration of the protocol clear channel transmission.

CAUTION Several different types of network digital facilities may be linked together to complete the end-to-end connection. Typically, these will be multiplex-derived facilities. Usually, the multiplexers will contain a bipolar violation monitor and removal circuit that corrects all bipolar violations (alters B8ZS type data) and also produces an all ones if a loss of input signal occurs. This bipolar violation monitor and removal feature is currently an inherent part of the MX3, M13, MX2, and M1C multiplexers, as well as most vendor's multiplexers.

Field 10

This option enables (1) or disable (0) collection of slip data to support excessive slip rate based on switching between the primary, secondary, or internal high-accuracy clocks. The decision to switch from one source to the other is normally based on an internal slip count calculation (software record). However, hardware events (such as primary link failures) may take precedence over any software controls.

Slips are caused by differences in clock frequencies. A slip results in the deletion or repetition of a single frame. Slips are not caused by noise on the line.

Those DS1/T1 spans that are used to provide the primary and secondary synchronization reference should be administered for slip enable (1). Since the switch software does this automatically, this task is not mandatory but is a good procedure to follow. Typically, those other DS1/T1 spans that are used for data applications and that are deemed important should also be administered for slip enable. This excludes all T1-spans connecting channel banks, unless the channel bank is externally timed. Normally, those DS1/T1 spans that are used exclusively for voice and that are not assigned as the primary or secondary synchronization source should be administered for slip disable (0). The goal is to keep that reference on-line, which minimizes slips for all those DS1s for which slips can't be tolerated.

The digital switch always maintains a slip count record for each DS1. Slip counts are calculated on a 24-hour continuous interval. As a historical record, the slip counts for each DS1 are maintained for the last 24 consecutive intervals. The slip count is used to determine if a DS1-span is experiencing errors and, if so, the severity of the errors (type alarm).

If the primary facility uses 24th-channel signaling and if the secondary facility uses RBS, then the primary will always be on-line unless a hardware event forces a switch to the secondary. A software algorithm is used to select the facility (primary or secondary) that is on-line for the cases where:

a. Both primary and secondary facilities use the same type of signaling (either 24th-channel or RBS)

b. The primary uses robbed-bit and the secondary uses 24th-channel signaling

Criteria for Switching to the Secondary

If as many as 50% of those spans that are administered for slip enable are experiencing slips (with respect to the primary), then a decision is made to switch to the secondary. On switching to the secondary, a software bit is set making the primary appear as though it has exceeded its maximum slip limit. At this point, the primary is not evaluated again for 1 hour.

Criteria for Switching Back to the Primary

At the end of the 1-hour interval, the slip count is analyzed. If the primary slip count is less than 2, then a switch back to the primary is made. Also, if the primary has a slip count of 44 or less and if the secondary and 50% of those DS1s that are enabled for slip enable have reached their maximum slip count of 88, then a switch back to the primary is made.

Field 11 Offers the options external loop not available `(0)` or available `(1)`.

The external loop available option should be selected only when demand diagnostic maintenance is done and then only after the interface has been busied out. This option is used with procedure 620, test 2, to extend the range of the test to include the network channel-terminating equipment (NCTE) and the connecting facility (any external equipment to the point of the DS1 loop around). The test requires that either the colocated or the distant NCTE be physically optioned for loopback mode.

The external loop available option should be used only for the duration of a test.

Field 12 Specifies whether `(1)` or not `(0)` the associated T1-span is used as an incoming synchronization source to the switch. The network synchronization diagram should show those transmission facilities that are used for synchronization. Each switch permits a maximum of two interfaces (one primary and one secondary) to be translated here. However, there is no requirement to have both.

When a Generic 2 is the master timing server, neither primary or secondary is administered. Each Generic 2 that is equipped with a DS1 will also contain a TN463 synchronization clock synchronizer (SC). For single-module systems, the SC is located in the module control carrier along with the TN460 module clock. For multimodule systems, the SC is located in the TMS carrier. The SC should have previously been assigned in procedure 250.

Field 13 Assigns whether a DS1 facility (translated in field 12) will be used as the primary or secondary synchronization source to the switch. Field encodes and their descriptions are:

0 Assigns that the facility is not used as a synchronization source

1 Assigns that the facility is the primary synchronization source

2 Assigns that the facility is the secondary synchronization source

NOTE: The primary must be administered before the secondary. The secondary must be removed before the primary.

Traditional modules may be configured with the ANN11 and/or ANN35 circuit packs. Only the slot translated 1 (primary) and/or the slot translated 2 (secondary) must be configured with synchronization cables. These cables connect the backplane of the translated DS1 to the backplane of the TN463. The cables are identified as group 334 for intercabinet and group 361 for intracabinet applications. When traditional modules are translated, field 20 will display the number (code 99) which shows that the switch could not read information from the DS1 circuit pack.

Universal modules may be configured with the TN767 circuit pack. The intercabinet cable (group 503) is required to connect to the TN463 SC, which will always be located in the TMS cabinet. For universal modules, whenever this field is translated, field 20 displays a number which corresponds to:

a. Whether the circuit pack is used as a synchronization source

b. If it is a synchronization source, then which type

c. Which cable connector (cable 0 or cable 1) contains the circuit pack synchronization leads

CAUTION A loop-timing problem can be created if synchronization sources are not administered correctly. The loop-timing problem exists as the result of an error where both switch endpoints (for the same T1-span) are administered as the primary. This causes the clock frequency to vary widely and can bring down the switch. Loop-timing problems can be avoided by following a correctly engineered network synchronization diagram.

NOTE: Depending on the application type (encode) translated, there may be additional administration, slot, and port grouping restrictions.

Field 14 Field encodes and their descriptions are:

0 Assigns that the DS1/DMI-BOS channels can be used for both trunks and lines (mixed); the latter is frequently called off-premises stations (OPS).

1 Assigns that the interface is used to provide DMI-BOS trunks. The DMI-BOS trunk groups are defined using procedure 100, word 1 (encode 108 and/or 109).

DMI-BOS applications use the switch's DS1 to provide a high-speed multiplexed data interface for connecting to compatible computers. The computers may be located on the same customer premises as the switch or many miles away. The DS1/T1-carrier facilities are used between the switch and remote computers.

The DMI-BOS application provides 23 data channels plus 1 signaling channel. Each data channel can be considered a 64K-bps clear-channel. However, permissible data rates depend on the trunk group translations selected in procedure 100, word 2.

24th-channel signaling is the only required service/facility option. All others (framing format and line coding format) are DMI application independent. However, the distant computer and all intermediate T1 transmission equipment must be compatible; refer to the caution regarding B8ZS line format and data communication protocols.

The ACCUNET switched digital service can be provided by setting up a trunk group with encode 109. However, a DS1 must be optioned for RBS (procedure 260 field 8). The only other administration requirement is that the trunk groups translation (field 3 of procedure 100, word 2) be enabled for 56K-bps encode one.

The trunk group used to provide ACCUNET switched digital service may contain as few as 1 or as many as 24 members. Therefore, the same DS1 may also be used to provide CO, FX, WATS, DID, and Remote Access trunks.

2 Assigns that the DS1 provides 24 lines. These are generally called off-premises stations (OPS).

When a DS1 facility is used exclusively for lines, it must be administered for RBS. Also, the facility cannot be used as a synchronization reference.

When a DS1 is administered for lines (OPS), it provides 24 channels that terminate in a remote D4-channel bank, CDM, or their equivalent.

Analog equipment location assignments are administered by procedure 000, word 1, with field 8 translated to a 2. The DSl/OPS channels are translated to equipment locations (individual extensions) with procedure 000, word 1, with field 8 translated to a 9, rather than with procedure 116 that was used for trunks.

5 Assigns that the DS1 is used to provide DMI-MOS or ISDN-PRI trunk facilities.

> **NOTE:** When encode 5 is administered, procedure 262 is automatically translated with standard default options. These default options should be rechecked later for consistency with the distant end (refer to procedure 262, word 1).

Field 15 Some facilities require that the contents of the D-channel be inverted to guarantee that the minimum ones density be maintained (that is, ZCS line coding is used). This field shows whether the D-channel is inverted or not. Field encodes and their descriptions are:

- (Dash) not applicable or ZCS line coding is translated in field 9. The dash is appropriate for all applications of the ANN11 circuit pack. RBS does not use the 24th-channel to transmit signaling information. 24th-channel signaling via the BOS interface uses A and B bits for signaling and the channel structure is such that the ones-density is never violated.

0 Assigns that the signaling information, contents of the D-channel, is inverted.

Either 0 or 1 must be administered for ISDN-PRI. Recall that B8ZS is recommended for ISDN-PRI applications. However, not all transmission facilities will permit B8ZS on an end-to-end basis. Administration must be coordinated with the network facilities/distant end to ensure compatibility.

NOTE: This field must be a dash (–) when ZCS line coding is selected with ISDN and for automatic inversion of the D-channel.

1 Assigns that the signaling information, contents of the D-channel, is not inverted. Option 1 (no inversion) is strongly recommended for use when B8ZS is administered in field 9.

NOTE: When connected to a 4ESS, you must inform the 4ESS on the order form whether bits are or are not inverted.

Field 16 Field encodes and their descriptions are:

- (Dash) DS1/DMI-BOS applications should be administered with a dash (-).

0 Indicates that DMI-MOS/ISDN-PRI applications use metallic cable facilities.

1 Indicates that DMI-MOS/ISDN-PRI applications use nonmetallic cable facilites. *

NOTE: Terminating fiber cable directly on the DS1/MFAT carrier or universal module port carrier is not currently supported. Therefore, this option is not applicable.

Field 17 This field is added to bring System 85 R2V4 into compliance with EIA specification PIN-1429. This EIA specification relates to bit-oriented-signaling (BOS); message-oriented-signaling (MOS) is defined by a CCITT specification.

Field encodes and their descriptions are:

- (Dash) not applicable

NOTE: The dash is appropriate for all applications of the ANN35 and TN767 circuit packs (both DMI-MOS and ISDN-PRI).

0 Appropriate for all applications of DS1/DMI-BOS except when connecting to a switch that uses the Canadian style of signaling.

1 Used when connecting to a DS1/DMI-BOS that uses the Canadian style signaling as specified in PN-1429.

Field 18 Loop length refers to the total cable distance between the switch and the NCTE, CDM, BCM32000, DSX-1 cross-connect, and T1 office repeater. Traditional modules may contain the ANN11 and/or ANN35 circuit packs. Both circuit packs contain DIP switches for setting the compensation value [refer to table 3-1, *System 85 Traditional Module Equalizer Settings (Metallic Cable)*]. Therefore, software administration is not applicable and the (–) should be administered for traditional modules.

Universal modules may contain the TN767 circuit pack. Line compensation value be administered in software. Table 7-7, *TN767 Compensation Values,* identifies the appropriate administration encode for distance intervals of 133 feet up to a maximum distance of 655 feet.

TABLE 7-7. TN767 Compensation Values

Distance to Midpoint or Endpoint (FT)		Compensation
22 AWG ABAM & 24 AWG PDS	**26 AWG PDS**	**Value**
0 to 133	0 to 90	0
133 to 266	90 to 180	1
266 to 399	180 to 270	2
399 to 532	270 to 360	3
532 to 665	360 to 450	4

NOTE: Compensation values assume 22-gauge ABAM or 24-gauge PDS cables. Two switches (colocated) can be up to 1310 feet apart with maximum compensation on both systems. If 26-gauge PDS cables are used, distances are reduced as assigned.

The T1 office repeaters or T1 line repeaters can be used when the on-premises distance limitation is exceeded. A T1 office repeater is required at each end of the connection to provide an interconnection range of up to 3000 feet. Each repeater only provides regeneration for the receive direction. The T1 line repeaters can be used to accommodate distances up to 6000 feet between switches. The T1 line repeaters can be used in tandem to accommodate greater distances.

Field 19 Field encodes and their descriptions are:

- – (Dash) required option for all traditional modules. It is also required for all ISDN-PRI links provided with universal modules.
- 0 Preferred for DS1 service provided with universal modules (shows that a DS1 provides standard DMI-BOS).
- 1 Assigns that the DS1 provides the AT&T proprietary method of signaling on the 24th channel. This option is required when connection to System 75 that uses TN722 circuit packs.

  NOTE: When connecting to a TN722B or ANN11 circuit pack, the recommended option is (0).

Field 20 This display-only field serves to show which cables contain which synchronization cables.

Procedure 262 Word 1: Additional DMI-MOS/ISDN-PRI Facility Options

Procedure 262 is used to administer the ANN35 and TN767 circuit packs. Figure 7-29, *Procedure 262 Word 1: Additional DMI-MOS/ISDN-PRI Facility Options (Generic 2)*, depicts this procedure.

```
                      ENHANCED MODE — PROCEDURE: 262, WORD: 1
                                ISDN BOARD PARAMETERS

EQUIPMENT  LOCATION                            13. PRI Interface Identifier:    [--]
   1.  Module:  [--]
   2. Cabinet:  [-]
   3. Carrier:  [-]
   4.    Slot:  [--]
   5. Circuit:  [--]

PRI  PARAMETERS
   6.               Interface Type:    [-]
   7.           Facility Test Code:    [--]
   8. Terminal  Endpoint Identifier:   [---]

PRI AND BRI LAYER 2 PARAMETERS
    9.   Timer T203:  [---]
   10.   Timer T200:  [---]
   11. Counter N200:  [--]
   12.    Counter K:  [-]

Connected  to  CC0  ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[        ] [        ] [F3 DATA] [        ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-29. Procedure 262 Word 1: Additional DMI-MOS/ISDN-PRI Facility 0ptions (Generic 2)

Fields 1-4 Assigns the circuit pack to an equipment location. These include the module number, cabinet number, port carrier number, and slot number.

> **NOTE:** Entries for these four fields are the default values from translating a 5 in field 14 of procedure 260. These entries should always be correct.

Field 5 *BRI Only*

For ISDN-PRI and DMI-MOS applications, the dash (-) is appropriate.

Field 6 Assigns this interface as the user `(0)` or the network `(1)` side. When connected to a 4ESS, the customer premises switch is always the user side. When not connected to a 4ESS (that is, when connected to another switch), one switch is the user side and the other the network side.

For MOS facilities (such as DMI-MOS and ISDN-PRI), each link must be segmented into user and network sides. At a Generic 2, each MOS-based facility connected to the public network is administered as the user side, while other connections (such as that to a 4ESS) are administered as the network side. For private network DMI-MOS and ISDN-PRI connections, additional care must be exercised in defining user and network sides. Specifically at each facility, only one end must be administered as the user side `(0)` while the alternate must be defined as the network side `(1).` If the private network node is a tandem switch, then that node may function as both user side and network side depending on the particular facility.

> **NOTE:** Whenever a Generic 2 connects to a host computer via MOS, the computer should always be assigned as the network side.

Field 7 This field is used for administering one of four facility test codes. For most installations it is desirable to enable or establish permission, thus allowing selected maintenance software to test the DMI-MOS/ISDN-PRI transmission facility on a demand basis.

Procedure 648 contains several tests that may be done on a demand basis (by executing procedure 648) whenever facility test codes 1, 2, or 3 are administered.

The DMI-MOS/ISDN-PRI communication protocol consists of three layers or levels. Level 1 is the physical layer. Level 2 is the data link layer. Level 3 is the network layer [also called the link access procedure on the D channel (LAPD)].

Field encodes and their descriptions are:

`0` Disables or prohibits maintenance testing from being done on the specified (module, cabinet, carrier, and slot) transmission facility.

`1` Assigns that a level-2 test may be executed via procedure 648.

Encode 1 should be translated for all DMI-MOS to host computer links.

`2` Assigns that only the level-3 network layer may be tested.

`3` Permits both level-2 and level-3 tests to be done.

Encode 3 should be used for all ISDN-PRI connections that terminate on a 4ESS if the Generic 2 is equipped with an SN261C analog/digital facility test circuit pack. If an SN261C is not present, use encode 1 instead.

Fields 8-12 are assigned the default values when the ANN35/TN767 circuit pack is assigned in procedure 260.

Field 8 This field accepts encodes from 0 to 126. However, all point-to-point (nonswitched) links, such as a System 85 R2V4 or Generic 2 DMI-MOS link to a host computer, must be administered with encode 0 (the default value).

Field 9 The field accepts encodes from 0 through 255, which correspond to 1 second intervals for a maximum elapsed time of 4 minutes and 15 seconds. The default value for this T203 timer is 30 (30 seconds). This timer functions to monitor the facility data link and specifies the maximum time allowed without frames being exchanged on a data link layer connection.

Field 10 The field accepts encodes from 0 through 255, which correspond to 0.1 seconds per increment for a maximum range of 25.5 seconds. The default value for this T200 timer is 10 (1 second). This timer functions to monitor multiple frame operation on the data link layer.

Field 11 This field defines a value for the N200 counter. The value determines the maximum number of frame retransmissions. Permitted are 1 to 10, with 3 being the default value.

Field 12 This field defines a value for the K counter. The value determines the maximum number of outstanding or unacknowledged information I frames. Permitted values are 1 to 10, with 7 being the default value.

NOTE: Administration values for these procedure 262 timers and counters must be coordinated with the other terminating end.

Field 13 *NFAS-PRI Only*

Use to specify NFAS arrangements (populate the ISDN interface ID within the channel ID IE). This information must match exactly on each end of the facility and the encode must come from the premise switch (as described in *Technical Publication 41459).* Field encodes and their descriptions are:

- Dash `(-),` the only value for non-NFAS arrangements
- Any number within the range of (0 through 31) for NFAS arrangements.

Procedure 262 Word 2: ISDN-PRI D-Channel Backup

This procedure is currently only applicable for certain ISDN-PRI connections. Specifically, those B-channel groups that use NFAS. Each of these groups is identified by a unique number known as the D-Channel group number. For NFAS, fields 2 through 5 define the D-channel for a signaling group. Figure 7-30, *Procedure 262 Word 2: ISDN-PRI D-Channel Backup (Generic 2),* depicts this procedure.

```
                     ENHANCED MODE — PROCEDURE: 262, WORD: 2
                           ISDN NFAS/D-CHANNEL BACKUP

 1. D-Channel Group Number: [---]

PRIMARY D-CHANNEL EQUIPMENT LOCATION
  2.  Module: [--]
  3. Cabinet: [-]
  4. Carrier: [-]
  5.    Slot: [--]

BACKUP D-CHANNEL EQUIPMENT LOCATION
  6.  Module: [--]
  7. Cabinet: [-]
  8. Carrier: [-]
  9.    Slot: [--]

DISPLAY ONLY
 10. Number of Trunks Assigned to This D-Channel Group: [---]

Connected to CC0 ON-LINE [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[        ] [        ] [F3 DATA] [        ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-30. Procedure 262 Word 2: ISDN-PRI D-Channel Backup (Generic 2)

Field 1 Identifies a particular D-channel group number. The range of encodes is 1 through 255.

> **NOTE:** ISDN trunks are assigned to a specific equipment location in procedure 116. Procedure 116 is also used to assign ISDN-PRI circuits to the D-Channel group numbers.

Fields 2-5 Assigns a particular circuit pack as providing the primary D-channel for the identified D-channel group number. Table 7-9, *Codeset Differences,* depicts the permitted equipment ranges.

> **NOTE:** The ISDN-PRI facility (slot) that is translated as the primary must have also been translated for (23B + 1D) signaling, procedure 260, field 7, must use encode 0.

Fields 6-9 Assigns a particular circuit pack as providing the backup D-Channel (which is optional) for the identified D-Channel Group Number. Table 7-9, *Codeset Differences,* depicts the permitted equipment ranges.

A prime objective for the design of each D-channel group is to have members from two or more modules. By accommodating this objective, it is highly recommended that the Backup D-Channel equipment location be a different module from that selected as the Primary D-Channel. The ISDN-PRI facility (slot) that is translated as the backup must be translated for (23B + 1D) signaling, procedure 260, field 7, must have encode (0).

Procedure 262 Word 3: ISDN-PRI Codeset Map Assignments

Depending on the terminating switch it may be necessary to administer a Codeset Map Assignment and convert from one codeset or codepoint to a different codeset or codepoint. This administration assignment is required for ISDN-PRI links originating on a Generic 2 and terminating on a System 85 R2V4. Figure 7-31, *Procedure 262 Word 3: ISDN-PRI Codeset Map Assignments (Generic 2),* depicts this procedure.

```
                 ENHANCED MODE — PROCEDURE: 262, WORD: 3
                          ISDN LINK PARAMETERS

EQUIPMENT LOCATION
   1.  Module: [--]
   2. Cabinet: [-]
   3. Carrier: [-]
   4.    Slot: [--]
   5. Circuit: [--]

 6.        Codeset Map Number: [--]
 7. Hyperactivity Management: [-]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-31. Procedure 262 Word 3: ISDN-PRI Codeset Map Assignments (Generic 2)

Fields 1-4 Assigns a particular equipment location/circuit pack to be given a codeset map number. Table 7-9, *Codeset Differences,* depicts the permitted equipment ranges.

Field 5 Assigns whether the circuit pack is BRI or PRI. dash (–) is appropriate for ISDN-PRI.

Field 6 Assigns a codeset map number. The permitted range is (0 through 15). Number selection is arbitrary, however; a suggestion is start with 0 and select higher numbers as needed.

When Codeset map numbers are translated they are assigned on a D-Channel Group number basis. All ISDN-PRI circuits within a D-Channel Group must be administered with the same Codeset Map Number.

Field 7 Assigns whether hyperactivity management will be enabled for the ISDN-PRI link. Hyperactivity is defined as erratic behavior by the D-signaling channel. Typically, a hyperactive link will generate an excessive amount of meaningless traffic. Excessive D-channel traffic may overload the module processor and degrade system performance.

Field encodes and their descriptions are:

- (Dash) not applicable. This would be administered for all ISDN-BRI links.

0 Disables hyperactivity management for the particular ISDN-PRI link (this is the recommended option for SNC links).

1 Enables hyperactivity management (recommended for all ISDN-PRI links except SNC links). This software (hyperactivity management) functions to monitor link performance, detect when certain error thresholds have been exceeded, busyout the link on exceeding the threshold, and record the failure reason as FAULT CODE 337 in the maintenance log.

Procedure 280 Word 1: ISDN-PRI Receive/Transmit Codeset Mapping

This procedure is used to translate Codeset Mapping parameters. Because switches sometimes differ in the codesets in which certain ISDN IEs are sent and also in the values of the opcodes of those IE, Generic 2 has the capability to map the codesets and opcodes to accommodate these different implementations across systems. For example, System 85 R2V4 implements the TCM IE in codeset 7 whereas Generic 2 implements it in codeset 6 by default. If Generic 2 must pass TCMs to or from a System R2V4, it must map the TCM IE from codeset 6 to codeset 7. When connected to a 4ESS, this mapping is necessary only if an R2V4 is present in an all-ISDN SDN network. Also note that the opcode value of the TCM IE and display does not need to be mapped to a different value.

Codeset mapping is implemented here as follows:

1. In field 1, assign an index in the range 0 to 15
2. In field 2, select *Incoming*
3. In field 3, select a codeset to be mapped in the incoming direction
4. In field 4, select an opcode (IE) belonging to the selected codeset
5. In field 5, select the codeset on the Generic 2 to which the incoming codeset from field 3 is to be mapped
6. In field 6, select the opcode on the Generic 2 to which the incoming opcode from field 4 is to be mapped
7. Steps 2 through 6 can be repeated up to 256 times for the incoming case.
8. When *Outgoing* is selected in field 2, repeat steps 3 through 7. For every incoming mapping there should be an identical outgoing mapping.
9. All of the above steps can be repeated up to 16 times (the number of map numbers available).
10. For each ANN35 or TN767 containing a primary D-channel to which you want codeset mapping, assign the map numbers in procedure 262, word 3.

NOTE: Different interfaces can have different map numbers assigned. For example, one interface can map the TCM to codeset 7 while another interface can map the TCM to codeset 0.

Table 7-8, *Codeset Mapping Requirements,* summarizes the current codeset mapping requirements for Generic 2:

Table 7-8. Codeset Mapping Requirements

IE	Codeset Map	Opcode Map	When Required
TCM	Map from codeset 6 to codeset 7 outgoing. Map from codeset 7 to codeset 6 incoming.	Map from opcode 8 to opcode 8 in both directions.	If a System 85 R2V4 is present in an end-to-end ISDN network with Generic 2, this codeset mapping is required.
Display	Map from codeset 6 to codeset 7 outgoing. Map from codeset 7 to codeset 6 incoming.	Map from opcode 40 to opcode 40 in both directions.	If a System 85 R2V4 is present in an end-to-end ISDN network with a Generic 2, this codeset mapping is required.

Figure 7-32, *Procedure 280 Word 1: ISDN-PRI Receive/Transmit Codeset Mapping (Generic 2),* depicts this procedure.

```
                 ENHANCED MODE PROCEDURE: 280, WORD: 1
                          ISDN CODESET MAPPING

 1. Codeset Map Number: [--]
 2.   Incoming/Outgoing: [-]

MAPPED FROM CODESET/INFORMATION ELEMENT
   3.                    Codeset: [-]
   4. Information Element Opcode: [---]

MAPPED TO CODESET/INFORMATION ELEMENT
   5.                    Codeset: [-]
   6. Information Element Opcode: [---]

DISPLAY ONLY
   7. Available Map Number Mappings: [---]




Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[        ] [        ] [F3 DATA] [        ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-32. Procedure 280 Word 1: ISDN-PRI Receive/Transmit Codeset Mapping (Generic 2)

Field 1 *Assigns a codeset map number (such as defined in procedure 262, word 3). Field encodes and their descriptions are: * *

- Dash (–), which disables codeset mapping. *
- Any number between 0 and 15 that is previously defined with procedure 262, word 3. * *

Field 2 * Specifies whether codeset mapping is for incoming messages or outgoing messages. Field encodes and their descriptions are: * *

0 Assigns mapping for incoming messages. *

1 Assigns mapping for outgoing messages. *

From a Generic 2 perspective, incoming means mapped from Codeset 6 to Codeset 7. While outgoing means Codeset 6 is mapped to Codeset 7. Two-way trunk groups will normally have a Codeset Map translated for both incoming and outgoing. |

Field 3 Specifies a mapped from codeset number. Permitted encodes are 0 to 7. These numbers correspond to the respective codesets on a number-per-number basis.

NOTE: Currently, codeset 1 through codeset 5 are reserved for future use. Thus, only encodes 6 and 7 are applicable for the codeset fields.

If field 2 is translated (0) for incoming then encode (7) is appropriate for field 3.

If field 2 is translated (1) for outgoing then encode (6) is appropriate for field 3.

Field 4 Identifies the IE code to be mapped from. Field encodes and their descriptions are:

- (Dash) is available but not recommended. If a dash were translated, all IEs would be mapped from one codeset to the other codeset on a one-to-one basis. Because some codeset 7 IEs are different from their numerical equivalent in codeset 6, it is generally NOT desirable to map on a one-to-one basis.

Table 7-9, *Codeset Differences,* identifies current IE differences between codeset 6 and codeset 7. |

TABLE 7-9. Codeset Differences |

IE Name	Codeset 6	CodeSet 7
Traveling Class Mark	8	8
Logical Link Identification	26	4
Display	40	40
Packet Layer Parameters	62	2
Link Layer Parameters	64	1

number Any number within the range of (0 through 127).

Field 5 Specifies a mapped-to codeset number. Permitted encodes are numbers within the range (0 through 7) These numbers correspond to the respective codesets on a number-per-number basis.

If field 2 is translated one for incoming, then encode seven is appropriate for field 5.

Field 6 Identifies the IE code to be mapped to. Permitted encodes are the same as field 4.

Field 7 Each code set map number may contain up to a maximum of 255 incoming and 255 outgoing mappings. This display-only field shows the number of mappings that remain (the number of unassigned mappings).

Procedure 354 Word 3: NPA-NXX Digits Assignment

This word and procedure are used to administer the ISDN numbering plan. Depending on the switch configuration, there may be more than one ISDN numbering plan. Contents of these fields make up a part of the station identification number (SID). The SID is transmitted in the calling number IE (part of the setup message) or connect party number (part of the connect message).

NOTE: This word need not be translated unless the application requires that SID or the connected number be transmitted to the network. If the SID is to be passed through the ISDN network, then it must also be administered here and in procedure 000, word 4.

Figure 7-33, *Procedure 354 Word 3: NPA-NXX Digits Assignment (Generic 2),* depicts this procedure. *

```
ENHANCED MODE — PROCEDURE: 354, WORD: 3
NPA-NXX ASSIGNMENTS

1. NPA-NXX  Deesignator:  [--]
2.                  NPA:  [---]
3.                  NXX:  [---]
4.   Thousand's  Digit:   [-]

Connected  to  CC0  ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter  command:
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-33. Procedure 354 Word 3: NPA-NXX Digits Assignment (Generic 2)

Field 1 This field should be translated for both private and public network connections. The NPA-NXX designator is a 2-digit field and within the range of 1 through 99.

Field 2 This 3-digit field should contain the Numbering Plan Area (NPA), which is also called the area code. The NPA is the area code in which the switch resides. Assignment is therefore dependent on the particular location and application.

Field 3 This 3-digit field should specify the NXX, which is also called the office code of the local exchange company. Permitted values must be those numbers within the range of 200 through 999 and must be the office code of the local exchange.

Field 4 This 1-digit field specifies the thousands digit. When not used, it should contain (-). When used, digits 0 through 9 may be assigned. Use this field only with three-digit dial plans. Do not use it with four- or five-digit dial plans.

Procedure 000 Word 3: Line-Side BCCOS Designator

This procedure assigns a BCCOS in field 5 to the extension shown in field 1. One implication of this COS is the pattern or preference selected for this extension on outgoing calls (see the *Procedure 309 Word 5* and *Procedure 321 Word 5* sections later in this chapter).

The 10 BCs are defined in field 16 of procedure 014, word 1. This definition codes the BC information element (IE) in the setup message when the extension (that is, the extension in field 1 of procedure 000, word 3) accesses an ISDN-PRI trunk for an outgoing call. Figure 7-34, *Procedure 000 Word 3: Line-Side BCCOS Designator,* depicts this procedure.

```
                 ENHANCED MODE — PROCEDURE: 000, WORD: 3
                 SINGLE TERMINAL - MISCELLANEOUS FEATURES

 1.                               Extension: [-----]
 2.                                Hot Line: [-]
 3. Dedicated Switch Connection Messages: [-]
 4.  Audible Message Waiting - Automatic: [-]
 5.   Bearer Capability Class of Service: [---]
 6.              Universal Code Calling ID: [---]

Connected to CC0 ON-LINE [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[      ] [      ] [F3 DATA] [      ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-34. Procedure 000 Word 3: Line-Side BCCOS Designator

Procedure 000 Word 4: NPA-NXX Index Designator

Depending on how the switch is used, procedure 000, word 4, may or may not be translated. Specifically, word 4, field 4, is used for partitioning, ISDN, or both, and must be translated when:

a. The switch transmits SID or connected number to the network

b. The switch provides unique extension number partitions

Field 4 of procedure 000, word 4, need not be translated when: the switch does not transmit SID or connected number to the network (public or private).

If the switch contains more than one office code, multiple NPA/NNX designators may be needed. Figure 7-35, *Procedure 000 Word 4: NPA-NXX Index Designator*, depicts this procedure.

```
                 ENHANCED MODE — PROCEDURE: 000, WORD: 4
                  EXTENSION NPA-NXX/PARTITION ASSIGNMENT

 1.     First Extension:   [-----]
 2.      Last Extension:   [-----]
 3. Extension Partition:   [---]
 4.   NPA-NXX Designator:  [--]

DISPLAY ONLY
   5. Invalid Extension:   [-----]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[        ] [        ] [F3 DATA] [        ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-35. Procedure 000 Word 4: NPA-NXX Index Designator

Field 1 Assigns a single extension number or the first extension number for a block of numbers. The single number or block of numbers will be unique in terms that they relate to a single extension partition identification.

Field 2 Assigns the last extension number for a block of numbers.

Field 3 Assigns the extension partition identification for the tenant services feature. This number associates the single or block of extension numbers to a particular ISDN facility (NPA-NXX Designator).

Field 4 Associates an NPA-NXX Designator with the previously defined extension.

Procedure 210 Word 2: LDN, NPA, and NNX Attendant Partition Assignments

This procedure is used to configure the attendant consoles into groups known as attendant partitions. Also, LDN and NPA-NXX assignments are completed, thus relating these assignments to a particular attendant console or attendant partition. Figure 7-36, *Procedure 210 Word 2: LDN, NPA, and NNX Attendant Partition Assignments*, depicts this procedure.

```
              ENHANCED MODE — PROCEDURE: 210, WORD: 2
             CONSOLE ASSIGNMENT - ATTENDANT PARTITIONS

1.      Console Number:   [--]
2. Attendant Partition:   [--]
3.             Control:   [-]
4.                 LDN:   [-----]
5.  NPA-NXX Designator:   [--]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-36. Procedure 210 Word 2: LDN, NPA, and NNX Attendant Partition Assignments

Field 1 Translates a console number. Permitted encodes are any 2-digit number within the range of 1 through 40.

> **NOTE:** This console must be previously assigned in procedure 210, word 1.

Field 2 Assigns the attendant partition number. Permitted encodes are any unused number within the range of 0-40.

Field 3 Assigns the one console in the attendant partition that will be the controlling console. All other members of this group must have control denied. Field encodes and their descriptions are:

0 For all but the controlling console

1 Only for the controlling console

Field 4 Assigns or associate the LDN with a particular console or console partition. The number is dependent on the switch or private network numbering plan.

Field 5 Assigns or associate the NPA-NNX designator with the console or console partition. The encode must be the same as that defined in procedure 354, word 3.

Procedure 014 Word 1: BCCOS Routing Options

This procedure is required to administer the attributes of each BCCOS assignment. Generic 2 permits up to a maximum of 256 different numeric assignments. The switch software is supplied with numbers (0 through 8) already defined. Each number (0 through 8) has different default parameters. Therefore, each number is unique and may be applied to a different type of routing configuration. It is currently believed that these numbers may be applied to meet the needs of most routing configurations.

If it is determined that the existing BCCOS numbers do not meet the needs of a particular routing configuration, then new numbers may be defined. New numbers should begin with 255 and continue in descending order. Refer to chapter 1, *Introduction,* for more information about BCCOS.

The differences between System 85 R2V4 and Generic 2 are:

1. With System 85 R2V4, BC and ISDN routing are administered in procedure 010, word 4; but, with Generic 2 these are moved to procedure 014, word 1.
2. With System 85 R2V4, the switch assumes that all user data/information will be presented for transmission in a form called Restricted. Restricted means that the data/information is encoded so that the all-zeroes octet will not occur. The DCP data modules encode user data into the form Restricted.

   With Generic 2, the switch administration software (procedure 014 word 1, field 3) assigns whether user data/information is presented to the switch as Restricted or Unrestricted. Unrestricted means that the data may contain the all-zeroes octet.
3. With System 85 R2V4, the AVD bit shows when a modem pool is required. With Generic 2, the BCCOS with AAR and ARS shows whether a modem pool is required.

Figure 7-37, *Procedure 014 Word 1: BCCOS Routing Options,* depicts this procedure.

```
             ENHANCED MODE — PROCEDURE: 014, WORD: 1
        BEARER CAPABILITY CLASS OF SERVICE — CALL OPTIONS

 1. Bearer Capability COS: [---]        DEFAULT CAPABILITIES
 2.        Transport Mode: [-]           14.    Transport Mode: [-]
 3.      Information Type: [-]           15.  Information Type: [-]
                                         16. Bearer Capability: [--]
CALL TYPES AND ACTION TAKEN
   4.            Voice: [-]
   5. Voice Grade Data: [-]
   6.           Mode 0: [-]
   7.           Mode 1: [-]
   8.           Mode 2: [-]
   9.           Mode 3: [-]
  10.  Unknown Digital: [-]
  11.   Unknown Analog: [-]
  12.         Mode 3/2: [-]
  13.             X.25: [-]

Connected to CC0 ON-LINE [MAJOR][MINOR][RUN TAPE][BUSY OUT][IN USE][WAIT]

enter command: _
[      ][      ][F3 DATA][      ][F5 HELP][F6 FIELD][F7 INPUT][F8 CMDS]
```

Figure 7-37. Procedure 014 Word 1: BCCOS Routing Options

Field 1 Translates new (additional) BCCOS numbers. Field encodes and their descriptions are:

- Dash (-) is used when the BCCOS does not support new numbers
- Numbers between (0 and 255)

Field 2 Assigns the transport mode. Field encodes and their descriptions are:

0 Circuit switch the call

1 Packet switch the call

2 Both circuit and packet

Field 3 Specifies whether the endpoint is unrestricted (1) or restricted (0) with respect to incoming calls.

It is the AAR/ARS software that routes calls. This software will block calls from an unrestricted type to a restricted type. As a contrast, the software will route calls from a restricted type to an unrestricted type. Furthermore, the software will route calls from restricted to restricted, depending on other attributes of the two BCCOS encodes.

Fields 4-13 The translation parameters administered for fields 4 through 13 determine what actions the switch will take for the BCCOS specified in field 1. Regarding Generic 2, it is important to remember that the administration (of the BCCOS) determines when a modem pool member is added and not the particular trunk type. By administering the BCCOS on an AAR/ARS preference basis allows a single trunk group to support both circuit switched and modem pooled calls. Field encodes and their descriptions are:

0 Circuit switch the call

1 Insert a mode 2 modem pool

2 Block the call

Fields 14 through 16 are the default capabilities assumed by the switch for an originating facility (on this switch) that does not have a BCCOS IE (non-ISDN). The switch assumes these default capabilities are acceptable to the originating facility when it tries to connect the originating facility to the terminating facility. These default capabilities are not the predefined BCCOSs that default through administration.

Field 14 Assigns a packet switched (1) or a circuit switched (0) call transport mode

Field 15 Assigns a clear (1) or a restricted (0) channel type. This relates to calls outgoing from an endpoint, except for DMI modes 0 or 3.

Field 16 The default BC class (BCC). Used for an outgoing call BC IE **(except for BRI modes).** (See chapter 1, *Introduction,* for more information about BC and BCC.) Field encodes and their descriptions are:

0 Voice

1 Mode 1

2 Mode 2

3 Mode 3

4 Mode 0

5 Voice grade data

6 Unknown digital

7 Unknown analog

8 Mode 3/2

9 X.25

Procedure 014 Word 2: BCCOS Data Options

This procedure is used to define the data capabilities for the modem pools. The data rates selected are dependent on local requirements and the particular type of analog modem used. Figure 7-38, *Procedure 014 Word 2: BCCOS Data Options,* depicts this procedure.

```
                    ENHANCED MODE — PROCEDURE: 014, WORD: 2
               BEARER CAPABILITY CLASS OF SERVICE — DATA OPTIONS

 1. Bearer Capability COS:    [---]

DATA RATE
    2. 64000 bps: [-]
    3. 56000 bps: [-]
    4. 19200 bps: [-]
    5.  9600 bps: [-]
    6.  4800 bps: [-]
    7.  2400 bps: [-]
    8.  1200 bps: [-]
    9.   300 bps: [-]
   10. Low Speed: [-]

11.       Synchronous:  [-]
12.            Duplex:  [-]
13.             Clock:  [-]
14. Default Data Rate:  [-]

 Connected to CC0 ON-LINE ♥ [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

 enter command: _
[      ] [      ] [F3 DATA] [      ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-38. Procedure 014 Word 2: BCCOS Data Options

Field 1 Translates BCCOS modem pool support. Field encodes and their descriptions are:

- Dash (–) is used when the BCCOS does not support modem pools
- Numbers between (0 and 255)

Field 2-10 These fields select the data rates (64000, 56000, 19200, 9600, 4800, 2400, 1200, 300, or low speed) supported by this modem pool. Field encodes and their descriptions are:

0 Not supported

1 Supported

Field 11 Defines if synchronization is (1) or is not (0) supported.

Field 12 Defines if half (1) or full (0) duplex operation is supported.

Field 13 Defines if an external (1) or an internal (0) clock source is used.

Field 14 Whenever a modem pool supports more than one data rate it is generally desirable to assign one data rate as a default or first choice. Field encodes and their descriptions are numbers (1 through 9; which correspond to Low, 300,...64000-bps respectively).

Procedure 010 Word 4: Line Side (B-Channel) ISDN Routing Options

Figure 7-39, *Procedure 010 Word 4: Line Side (B-Channel) ISDN Routing Options*, depicts this procedure.

```
                  ENHANCED MODE — PROCEDURE: 010, WORD: 4
                  EXTENSION CLASS OF SERVICE — RESTRICTIONS

1.          Class of Service: [--]
2. Maximum Precedence Level: [-]
3.              ISDN Routing: [-]

Connected to CC0 ON-LINE ▽ [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-39. Procedure 010 Word 4: Terminal COS Restrictions (Generic 2)

Field 1 When ISDN is administered, each COS assignment must have an associated BC and ISDN routing assignment. That is to say that whenever ISDN is enabled, all COS assignments must also be translated for procedure 010, word 4. COS assignments must be within the 2-digit range of 1 through 63.

Field 2 This field's encodes are only useful for AUTOVON applications. Dash `(-)` is appropriate for ISDN applications.

Field 3 * This field shows the ISDN-PRI routing option. Field encodes and their descriptions are:

0 Any type of trunking facility is OK. The 0 option should be used when there are no specific requirements for ISDN-PRI trunks. Generally, this will include all voice and voice-grade data applications (BC code = 0) except those where user-to-user information transfer is desired (for example, SID/display).

1 ISDN-PRI trunking facilities are required. Generally, these applications include those COS groups established for Mode 1 data (BC code = 1), Mode 3 data (BC code = 3), and Mode 0 data (BC code = 4).

NOTE: Mode 0 data, depending on its origin, may require a restricted channel. Recall that an unrestricted channel is only provided by those ISDN-PRI facilities that use the B8ZS line-coding format.

2 Any trunking facility will work but ISDN-PRI trunk facilities are preferred. This may include voice and voice-grade data (BC code = 0) and Mode 2 data (BC code = 2).

Procedure 100 Word 1: Trunk Group Type Signaling and Dial Access (ID) Code

Translating word 1 is the first step in establishing trunk groups. Those trunk groups established for ISDN applications may be of the same design as those for non-ISDN applications, except for the type of signaling used. Or, they may (optionally) be designed to take maximum advantage of the ISDN capabilities (such as with the Integrated Telemarketing Gateway or ITG). Figure 7-40, *Procedure 100 Word 1: Trunk Group Type Signaling and Dial Access (ID) Code,* depicts this procedure.

```
ENHANCED MODE — PROCEDURE: 100, WORD: 1
TRUNK GROUP TRANSLATION

 1. Trunk Group:  [---]

DIAL ACCESS CODE/TRUNK ID CODE
   2. Digit 1:  [--]
   3. Digit 2:  [-]
   4. Digit 3:  [-]
   5. Digit 4:  [-]

 6. Trunk Type:  [---]
 7.     Dial Access Restriction:   [-]
 8.  Personal CO Line Appearance:  [-]
 9. Public Network Access/Egress:  [-]

DISPLAY ONLY
  10. Signaling Type:  [---]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[     ] [     ] [F3 DATA] [     ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-40. Procedure 100 Word 1: Trunk Group Type Signaling and Dial Access (ID) Code (Generic 2)

Field 1 Assigns a trunk group number. Permitted entries include any not already used number within the range of 18 through 999.

Field 2 Assigns the first digit of the trunk access code. Permitted entries are 0 through 9 for digits 0 through 9 and with 11 and 12 for the symbols * and #, respectively.

Field 3 Assigns the second digit of the trunk access code. Permitted entries include digits 0 through 9.

Field 4 Assigns the third digit of the trunk access code. Permitted entries include digits 0 through 9.

Field 5 Assigns the fourth digit of the trunk access code. Permitted entries include digits 0 through 9.

Field 6 Defines the trunk type of a specific trunk group. The ISDN-PRI facilities may be used to support several different trunk types. These may include both conventional trunk types as well as the ISDN-dynamic trunk type. An important point to remember is that the particular service application and the incoming digits are the primary determining factors that control which trunk type is selected. Most service applications may be supported (over ISDN facilities) by either a conventional trunk type or ISDN-dynamic.

Table 7-10, *Trunks Supporting Signaling Type 20*, shows some permitted field entries that support signaling type 20.

NOTE: Trunk types not included in the categories listed in table 7-10 may not be translated for ISDN-PRI service. Most conventional trunk types specify, as a part of their name, an in/out signaling sequence. Actually, these signaling sequences are disabled and type 20 signaling is used exclusively over ISDN facilities.

TABLE 7-10. Trunks Supporting Signaling Type 20

Trunk Description	Trunk Type
2-way CCSA/APLT	12—15
CO	16, *17 (Note), 18—20
Data	100—107
DID	*30, *31
DMI	*108, *109
FX	21—25
ISDN	120
M/S TIE	70—78
Special	2, 5, 6, 50—58, 62, 65—67, 90—93
TIE	32—40, *41, *42, *43, 44, 45, *46, *47
WATS	26, *27, 28

NOTE: Trunk types preceded with an asterisk (*) may be selected by trunk type 120 on an as needed CBC Service Selection basis.

For ISDN trunk groups as well as other types of trunk groups, the entered type defines feature operation for the trunk group. For example, if a trunk group is assigned the type of 19, incoming calls over this trunk group are routed to the attendant console. On DID trunk type groups, the switch expects station number digits on all incoming trunks; on tie trunk type groups the switch can handle either station number digits or network numbers.

For an ISDN trunk group, a dynamic trunk type (120) can be assigned to the group. This trunk type allows the group to process calls with a different trunk type on a call by call (CBC) basis. For example, one incoming call over the group may expect station number digits (for example, a MEGACOM call), while the next call over the group may expect a network number (for example, an SDN call).

This trunk type allows flexibility in processing calls as opposed to a fixed static trunk type. Both an AAR/ARS prefix digit (procedure 103) and a DID additional digit (procedure 101) can be administered for ISDN dynamic trunk groups. (This cannot be done for any other type of trunk group.) The dynamic trunk type may be used for CBC service although any of the conventional trunk types could also be used if incoming digits have been provisioned consistently. For example, trunk type 41 could be used as a CBC trunk group to support MEGACOM, MEGACOM 800, and SDN if the incoming digits (for both MEGACOM 800 and SDN) reflect extension numbers or seven digit RNX-XXXX numbers. Customers can choose between 0 and 7 incoming digits to a switch.

Field 7 Assigns the dial access code restriction. Field encodes and their descriptions are:

- `0` Allows access to the trunk group via a dial access code.
- `1` Restricts and only allows access to the trunk group for trunk testing and for providing unattended console service.

Field 8 Assigns the trunk group as a Multifunction Terminal CO line appearance. This is not applicable to ISDN so assign encode `0` here.

Field 9 Assigns the type of network access for the trunk group. Encodes are:

- `0` Allows access to the public network
- `1` Allows access to private network facilities

Field 10 Displays and verify that the type of trunk signaling is correct. ISDN uses message-oriented signaling. Therefore, encode 20 should be displayed.

Procedure 100 Word 2: Trunk Group Data Translations

This word is used to administer data characteristics for each trunk group (including BCCOS). Figure 7-41, *Procedure 100 Word 2: Trunk Group Data Translations*, depicts this procedure.

```
                ENHANCED MODE — PROCEDURE: 100, WORD: 2
                TRUNK GROUPS — MODEM POOLING AND BCCOS

1.                          Trunk Group: [---]
2. Bearer Capability Class of Service: [---]

MODEM POOLING
  3. Originate Mode: [-]
  4.    Answer Mode: [-]
  5.     Modem Type: [-]
  6.   First Choice: [-]

7. Test Type: [-]

Connected to CC0 ON-LINE [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-41. Procedure 100 Word 2: Trunk Group Data Translations (Generic 2)

Field 1 Specifies a particular trunk group. The field encode will be the same as previously translated in procedure 100, word 1.

Field 2 Assigns a BCCOS to the trunk group. This field is used for non-ISDN to ISDN tandem connections. The permitted range of encodes is (0 through 255). Field encodes and their descriptions are:

0 Voice

1 Mode 2 Data

2 Voice

3 Unknown Digital

4 Unknown Analog

5 Voice Grade Data

6 Mode 0 data

7 Mode 1 data

8 Mode 3 data

9 X.25 Packet Switched on B-channel

NOTE: All calls use the BCCOS assigned to preferences in routing patterns as administered in procedures 309 word 1 and 321 word 5. If not assigned to preferences, the preference will default to the BCCOS of the associated trunk group.

Procedure 100 Word 3: ISDN Trunk Group Signaling Options

The trunk type and signaling type attributes are translated as individual parameters. Figure 7-42, *Procedure 100 Word 3: ISDN Trunk Group Signaling Options,* depicts this procedure.

```
ENHANCED MODE — PROCEDURE: 100, WORD: 3
TRUNK GROUPS — SIGNALING AND OTHER PARAMETERS

1.        Trunk Group: [---]
2. Signaling Type: [---]
3.              Glare: [-]
4.              Retry: [-]
5. Outgoing Maintenance Busy Out Seizure: [-]
6.             Incoming Permanent Seizure: [-]
7.                      Failure Threshold: [--]
8.  Optional ISDN Information Inhibited: [-]
9.                   Network Service Value: [---]

DISPLAY ONLY
  10. Trunk Type: [---]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]
enter command: _
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-42. Procedure 100 Word 3: ISDN Trunk Group Signaling Options (Generic 2)

Field 1 Specifies a trunk group. Permitted entries include any not already used number within the range of 18 to 999.

Field 2 Specifies the signaling type for the trunk group. For ISDN, use signaling type 20.

Field 3 For all ISDN trunking applications except DCS, glare is resolved by the ISDN protocol. Therefore, this field is ignored for ISDN applications.

Glare is discussed in more detail in chapter 2, *Network Connections and Configurations.* Specifically, ISDN negotiates the losing call to a different channel if the original channel is preferred. Exclusive calls (such as DCS) are not negotiated and the user hears the reorder tone. In either case, the network has priority over the user when both calls are preferred or exclusive. This capability is administered in field 5 of procedure 262, word 1.

Field 4 Retry permits multiple attempts to seize a busy trunk from the specified trunk group.

This field is primarily applicable for those trunk groups routed over analog facilities and uses trunk types 41, 42, 43, 46, or 47. Depending on the particular configuration, retry may or may not be applicable for ISDN applications. Field encodes and their descriptions are:

0 Multiple retry is not desired, that is retry not active

> **NOTE:** The ISDN-PRI protocol contains an automatic retry capability. Whenever trunk type 120 is selected, the zero (0) encode is required.

1 Recommended for ISDN applications where the 40-series of trunk types is used. This encode enables a double try single retry and thus provides slightly improved call completion, particularly for large trunk groups that span across more than one transmission facility.

Field 5 Not applicable for ISDN applications (encode must be 0 for not active).

Field 6 Not applicable for ISDN applications (encode must be 0 for not active).

Field 7 Not applicable for ISDN applications (encode must be 0 for no failure threshold).

> **NOTE:** This field is only applicable for analog trunk facilities. It permits the user to establish a trunk failure threshold that, when exceeded, will generate an alarm. The threshold limit will affect service availability and, on an indirect basis, the customer's maintenance costs.

Field 8 Permits user control of whether optional ISDN IEs are transmitted and whether access to other ISDN network features is desired.

The optional ISDN IEs include the following:

- Calling number display
- *Connected party number
- *User-to-user information
- *Called party name
- *Calling party name
- *Data mode 3 parameters
- *Traveling class marks

> **NOTE:** Items preceded with an asterisk (*) are only transmitted on an end-to-end basis whenever all public network links are provided with CCITT interoffice communication.

Field encodes and their descriptions are:

\- (Dash) only applicable whenever ISDN is not available

0 Recommended for all ISDN configurations, both public and private network arrangements.

1 Do not transmit the optional ISDN IEs.

Field 9 Specifies the network service that is requested for trunk verification by station (TVS). The following table shows permitted field entries that support signaling type 20.

Trunks Supporting Signaling Type 20

Trunk Description	Trunk Type
CO	16, *17 (Note 1), 18, 19, 20
Data	100—107
DID	*30, *31
DMI (Note 2)	*108, *109
FX	21—25
ISDN	120 (Note 3)
M/S TIE	70—78
Special	2, 5, 6, 50—58, 62, 65—67, 90—93
TIE	32—40, *41, *42, *43, 44, 45, *46, *47
WATS	26, *27, 28

NOTES:

1. Trunk types preceded with an asterisk (*) may be selected by trunk type 120 on an as needed Call-By-Call (CBC) Service Selection basis.
2. Trunk types not included in these categories may not be translated for ISDN-PRI service. Most conventional trunk types specify, as a part of their name, an in/out signaling sequence. Actually, these signaling sequences are disabled and type 20 signaling is used exclusively over ISDN facilities.
3. Beginning with the 1.0 software load of Generic 2 and the 1.2 software load of System 85 R2V4 digits may be inferred where using the ISDN-dynamic trunk type. The default of 30 infers DID (if necessary). A default of 46 infers AAR/ARS. (See Appendix C, "Administrative Procedure Summary," for a complete explanation of this field.)

Field 10 Used as a display-only field. This field displays the trunk type that was administered in procedure 100, word 1.

Procedure 101 Word 1: ISDN Trunk Group, CDR, and Digital Loss Plan

Procedure 101, word 1, is used (primarily) to turn on CDR, as well as translate the digital loss plan. Figure 7-43, *Procedure 101 Word 1: ISDN Trunk Group, CDR, and Digital Loss Plan,* depicts this procedure.

```
ENHANCED MODE — PROCEDURE: 101, WORD: 1
TRUNK GROUP CHARACTERISTICS

 1.           Trunk Group:  [---]
 2.               Balance:  [-]
 3.      Battery Reversal:  [-]
 4. Incoming Prefix Digit:  [-]
 5.                   DCS:  [-]
 6.          Touch-Tone In:  [-]
 7.         Touch-Tone Out:  [-]
 8.            CDR Active:  [-]
 9.    AIOD Billing Number:  [----]
TIMED  RECALL
  10.  Time:  [--]
  11. Level:  [-]
12.      CDR Variable Timer:  [--]
13.               Pad Group:  [-]
14.                Tie Toll:  [-]
15.  APLT Features Allowed:  [-]
16. Disconnect  Supervision:  [-]

Connected  to  CC0  ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter  command:
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-43. Procedure 101 Word 1: ISDN Trunk Group, CDR, and Digital Loss Plan (Generic 2)

Field 1 Displays the trunk group number, such as previously translated in procedure 100.

Field 2 Assigns whether the trunk group has (1) or does not have (0) balanced transmission facilities. Encode 1 is required for ISDN-PRI.

Field 3 Assigns whether the trunk group has (1) or does not have (0) the battery reversal option. Encode 0 is required for ISDN-PRI.

Field 4 Assigns the number of prefix digits. Field encodes and their descriptions are:

- Dash (-) is always applicable for ISDN-PRI applications except for DID trunks (trunk types 30 and 31).
- Any single digit number (0 through 9). Which number is determined by the trunk group and its application.

Field 5 Assigns whether the trunk group is (1) or is not (0) used for DCS applications.

Fields 6-7 This field is ignored for ISDN applications and either encode (0 or 1) may be translated.

Field 8 Assigns or not assign the trunk group to CDR record keeping. Field encodes and their descriptions are:

0 Trunk group usage not applicable for CDR recording

1 Trunk group usage will be recorded by CDR

2 Trunk group usage will be recorded, account code is required

Fields 9-11 Not used for ISDN applications.

Field 12 This field is only applicable when CDR is being used, and then only to change the default CDR timer value. Field encodes represent intervals in 1-second increments. The range is 1 through 99 with dash (-) being the default timer value of 6 seconds.

Field 13 Administers the optional transmission loss assignments. The encode translated depends on the network configuration and service application. Field encodes and their corresponding loss plan are listed as follows:

0 The Digital FIXED Loss Plan

1 ISL Tie Trunk

2 EIA Tie Trunk

NOTE: This is the recommended option for Speedial Access Connections to a 4ESS.

3 ISL Digital Central Office

4 EIA Digital Central Office

5 Digital Toll Office

6 Analog Toll Office

7 AUTOPLEX NETWORK Interface V

8 AUTOPLEX NETWORK Interface Y

Refer to chapter 4, *The Digital Loss Plan,* for a description of the digital loss plan and to table 4-2, *Digital Loss Plan (Port-to-Port Losses),* in this same chapter for a list of port-to-port loss values.

Fields 14-16 These fields are ignored by ISDN software. Either encode (0 or 1) is satisfactory.

Procedure 103 Word 1: Network Trunk Group Translations

This procedure is used to translate the trunk group network parameters. Figure 7-44, *Procedure 103 Word 1: Network Trunk Group Translations,* depicts this procedure.

```
              ENHANCED MODE — PROCEDURE: 103, WORD: 1
                 NETWORK TRUNK GROUP TRANSLATION

 1.                      Trunk Group:    [---]
 2.       Facility Restriction Level:    [-]
 3.                    Network Trunk:    [-]
 4.                     Main/Tandem:     [-]
 5. Incoming Tie to AAR/ARS or APLT:    [-]
 6.     Authorization Code Required:    [-]
 7.                Bridge-On Allowed:    [-]
 8.          Trunk Reservation Limit:    [--]
 9.                   AAR/ARS Prefix:    [-]
10.      Data Protection (Permanent):    [-]
11.     Remote Access Echo Suppressor:   [-]
12.          AAR Conditional Routing:    [-]
13.                       Second TCM:    [-]
14.                 Digit Collection:    [-]

Connected to CC0 ON-LINE  | MAJOR | MINOR | RUN TAPE | BUSY OUT | IN USE | WAIT |

enter command:
|  |  | F3 DATA |  | F5 HELP | F6 FIELD | F7 INPUT | F8 CMDS |
```

Figure 7-44. Procedure 103 Word 1: Network Trunk Group Translations (Generic 2)

Field 1 Displays the trunk group number, such as previously administered in procedure 100 and 101.

Fields 2-13 The ISDN-PRI does not place any new or additional considerations on translating these fields. The encodes that are translated are generally dependent on each trunk group, its application, and the associated trunk groups.

Field 14 Specifies how the dialed digits are outpulsed. Field encodes and their descriptions are:

- 0 Digit outpulsing may overlap digit reception.
- 1 All digits must be received before outpulsing may start. All ISDN applications, regardless of the trunk type, require that a (1) be translated in this field. Digit outpulsing does not begin until all digits are received. Then digits are outpulsed as ASCII characters — per the ISDN recommendations.

Procedure 116 Word 1: DS1/DMI/ISDN-PRI Trunk Assignments

For more information, see chapter 6, *Port Types/Installation Compatibilities.* Each analog trunk circuit pack provides four circuits that are administered by using procedure 150. Conversely, each DS1 provides 24 circuits (channels) that are administered by using procedure 116.

For traditional modules, each DS1/MFAT carrier will support a maximum of two DS1s, each occupying one slot and located in slots 5 and 18. When a DSl/DMI/ISDN interface (trunk applications) is located in slot 5, it uses the six slots 0, 1, 2, 5, 6, and 7. When the interface is located in slot 18, it uses the six slots 13, 14, 15, 18, 19, and 20. Figure 7-45, *Procedure 116 Word 1: DSI/DMI/ISDN-PRI Trunk Assignments,* depicts this procedure.

```
                  ENHANCED MODE — PROCEDURE: 116, WORD: 1
                       DS1 AND ISDN TRUNK ASSIGNMENTS

EQUIPMENT  LOCATION
   1.  Module:  [--]
   2. Cabinet:  [-]
   3. Carrier:  [-]
   4.    Slot:  [--]
   5. Circuit:  [--]

 6.          Trunk Group:    [---]
 7.       Night Terminal:    [-----]
 8.    Disable Signaling:    [-]
 9. AIOD Equipment Number:   [----]
10.     Interface Endpoint:  [-]
11. D-Channel Group Number:  [---]

Connected  to  CC0  ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-45. Procedure 116 Word 1: DS1/DMI/ISDN-PRI Trunk Assignments (Generic 2)

The DS1 channels are assigned to slot and circuit locations according to the order in which the module processor scans the equipment carrier as shown in table 7-11, *DS1/ISDN-PRI Administration — Channel Versus Trunk Assignments.*

When the traditional module DS1/MFAT carrier is configured with two DS1s, physical slots 3, 8, 16, and 21 are available for other applications. If only one DS1 is configured, then six additional slots are available for other applications.

TABLE 7-11. DS1/ISDN-PRI Administration — Channel Versus Trunk Assignments

DS1 Channel	Slot/Circuit	DS1 Channel	Slot/Circuit
1	5/0 or 18/0	13	0/0 or 13/0
2	6/0 or 19/0	14	1/0 or 14/0
3	7/0 or 20/0	15	2/0 or 15/0
4	5/1 or 18/1	16	0/1 or 13/1
5	6/1 or 19/1	17	1/1 or 14/1
6	7/1 or 20/1	18	2/1 or 15/1
7	5/2 or 18/2	19	0/2 or 13/2
8	6/2 or 19/2	20	1/2 or 14/2
9	7/2 or 20/2	21	2/2 or 15/2
10	5/3 or 18/3	22	0/3 or 13/3
11	6/3 or 19/3	23	1/3 or 14/3
12	7/3 or 20/3	24	2/3 or 15/3

When the traditional module DS1-MFAT carrier is configured with two DS1s, physical slots 3, 8, 16, and 21 are available for other applications. If only one DS1 is configured, then six additional slots are available for other applications.

To minimize confusion and eliminate the need for maintaining elaborate trunk to channel cross-reference tables, trunk group member assignments should match the DS1 channel assignments; for example, trunk group member 1 on channel 1. For example, using procedure 116, word 1, refer to table 7-10, *DS1/ISDN-PRI Administration — Channel Versus Trunk Assignments,* to determine which slot and circuit to translate for channel 1. Repeat this procedure by sequentially selecting DS1 channels (2, 3, and so on) and translating the appropriate slot and circuits as required.

Fields 1-5 These fields are used to translate the equipment location, including slot and circuit (channel) location, and to associate the equipment location (channel) with the particular trunk group translated in field 6.

Field 6 Translates the trunk group. Permitted encodes must be numbers with the range of 18 through 999.

Field 7 Translates a particular number that functions as the night service number. The digits depend on the particular application and its numbering plan.

Field 8 Disables a channel's signaling. This disable function is required for establishing a dedicated switched connection. Field encodes and their descriptions are:

- 0 Signaling is enabled (default value).
- 1 Signaling is disabled. This option is only translated for the channels that is used as a dedicated switched connection.

Field 9 Not applicable for ISDN-PRI.

Field 10 Assigns the function of the terminating endpoint. For PRI nodal services, this endpoint is the network. Field encodes and their descriptions are:

0 Another customer premises switch

1 A private network connection to a host computer

2 Public network connections

Field 11 Translates the D-channel group number. These numbers should be coordinated with field 1 of procedure 262, word 2. Field encodes and their descriptions are:

- Dash (-), for non-NFAS arrangements.
- Numbers within the range 1 through 255 for all NFAS arrangements.

Procedure 012 Word 1: Name Database

The name database is used by those features (such as DCS, ISDN-PRI) which provide display type information to voice terminals. Some examples of common display information are: calling party name, vector directory number, and trunk group name. For ISDN-PRI applications, the name database information is used to populate the display IE. Figure 7-46, *Procedure 012 Word 1: Name Database,* depicts this procedure.

```
                ENHANCED MODE — PROCEDURE: 012, WORD: 1
                   NAME DATABASE — NAME TO BE DISPLAYED

1. Extension, VDN, or Trunk Group:    [-----]
2.                     Type:  [-]
3.            Display Start:  [--]
4. Outgoing Trunk Display:   [-]
5.                Copy Mode:  [-]
6. Extension, VDN, or Trunk Group to Copy or Share:    [-----]

DISPLAY ONLY
   7.                        Characters In Name:    [--]
   8. Shared Primary Extensions or Trunk Groups:    [--]
   9.       Associated Extension Name Assigned:     [-]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[      ] [      ] [F3 DATA] [      ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-46. Procedure 012 Word 1: Name Database (Generic 2)

Field 1 Assigns either an extension number, vector directory number, or trunk group. Field encodes and their descriptions are:

- 000 through 99999, for extension and directory numbers. Whether the number is three, four, or five digits depends on the numbering plan.
- 18 through 999, for trunk group numbers.

Field 2 Specifies whether the encode for field 1 is a trunk group or extension/vector directory number. Field encodes and their descriptions are:

`0` Trunk groups

`1` Extension numbers and vector directory numbers

Field 3 This field is only applicable for the identified extension's display module. It controls the number of blank spaces that are inserted before the first displayed character of the name, dialed number, or trunk group name. Permitted encodes are numbers from 1 to 30.

Field 4 The main function of this field is to provide some administration control over what is displayed on the voice terminals digital display. Field encodes and their descriptions are:

`-` (Dash) all incoming only trunk groups

`0` The user (extension) does not want the outgoing trunk group name displayed but does desire the dialed number to remain on the display

`1` The user desires to display the name of the outgoing trunk group (for example, ISDN/SDN, MEGACOM, CBC)

> **NOTE:** For a tandem interworking call the name of the incoming trunk group is transmitted in the display IE of the ISDN-PRI outgoing trunk group.

Field 5 Assigns the method used to define the name. Field encodes and their descriptions are:

`0` Add a new name or change an existing name; requires that the name change be made with word 2

`1` Copy the name from the extension or trunk group displayed in field 6

Field 6 This field is used with field 5 to copy an existing name to the extension or trunk group identified in field 1. Field encodes and their descriptions are:

- 000 through 99999, for extension and directory numbers. Whether the number is three, four, or five digits depends on the numbering plan.
- 18 through 999, for trunk group numbers.

Procedure 012 Word 2: Name Database

This word is used to translate a name (up to a maximum of 30 characters). Figure 7-47, *Procedure 012 Word 2: Name Database*, depicts this procedure.

```
                    ENHANCED MODE — PROCEDURE: 012, WORD: 2
                           NAME DATABASE — ENTRY

 1. Segment: [-]

CHARACTER ENCODES
   2. Character 1:  [--]
   3. Charaacter 2: [--]
   4. Character 3:  [--]
   5. Character 4:  [--]
   6. Character 5:  [--]
   7. Character 6:  [--]
   8. Character 7:  [--]
   9. Character 8:  [--]
  10. Character 9:  [--]
  11. Character 10: [--]

Connected to CC0 ON-LINE ♡ [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[      ] [      ] [F3 DATA] [      ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-47. Procedure 012 Word 2: Name Database (Generic 2)

Field 1 Identifies one-of-three 10 character fields. Field encodes and their descriptions are:

1 Characters 1 through 10

2 Characters 11 through 20

3 Characters 21 through 30

There exists 94 different encodes (00-12, 14, 15, 17-96) which correspond to numbers 0 through 9, lower case letters, upper case letters, and special characters. The Manager II help screen or the document *DEFINITY Communications System Generic 2 Administration Procedures* (555-104-506) may be used for determining the desired encodes.

Fields 2-11 Each field should be translated with the encode that corresponds to the desired character.

Procedure 012 Word 3: Name Database

Since the name database has the potential to use a large amount of memory it is generally desirable to run the compact operation whenever all names have been added. Figure 7-48, *Procedure 012 Word 3: Name Database,* depicts this procedure.

```
                    ENHANCED MODE — PROCEDURE: 012, WORD:3
                          NAME DATABASE COMPACTION

 1. Compact: [-]

DISPLAY ONLY
   2.   Names That Can Yet Be Assigned:     [-----]
   3.                  Words Available:     [------]
   4. Words to Be Gained by Compacting:     [------]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-48. Procedure 012 Word 3: Name Database (Generic 2)

Field 1 Assigns whether the name database is (1) or is not (0) to be compacted.

Fields 2-4 Are display only and serve to show status of the database.

Procedure 279 Word 1: Network Facilities Coding

Each interexchange carrier (which provides public network ISDN service) must have a unique identifier number. Furthermore, each carrier may provide multiple ISDN services and ISDN features that must be individually identified via a Network Specific Facility (NSF) coding value. A NSF is an ISDN IE (sent in the setup message) that is used to identify the network or feature associated with the call. When connected to a 4ESS, a Generic 2 must send the appropriate NSF for MEGACOM, SDN, and ACCUNET switched digital service calls. (MEGACOM 800 service calls do not require an NSF since it is an incoming-only service and the Generic 2 cannot tandem it to another switch as a MEGACOM 800 call.)

> **NOTE:** All NSFs must be defined in field 1 of this procedure prior to use in field 5 of procedure 309, word 5, and field 4 of procedure 321, word 5 should all have the same value.

Figure 7-49, *Procedure 279 Word 1: Network Facilities Coding*, depicts this procedure.

```
                    ENHANCED MODE — PROCEDURE: 279, WORD: 1
                         NETWORK-SPECIFIC  FACILITY

 1. ISDN Network Service Value:    [---]

ISDN NETWORK DEFINITION
   2. Parameterized — Binary:    [-]
   3.      Feature — Service:    [-]
   4.  Facility Coding Value:    [--]

PARAMETERS
    5. Parameter 1:  [--]
    6. Parameter 2:  [--]
    7. Parameter 3:  [--]
    8. Parameter 4:  [--]
    9. Parameter 5:  [--]
   10. Parameter 6:  [--]
   11. Parameter 7:  [--]



Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[      ] [      ] [F3 DATA] [      ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-49. Procedure 279 Word 1: Network Facilities Coding (Generic 2)

Field 1 Translates Network Service. This field is an arbitrary index number that you use to identify the NSF defined in the rest of the fields.

Field encodes and their descriptions are:

- Dash (–), whenever a carrier identifier number is not applicable.
- Numbers (1 through 511).

For most ISDN public network connections it is expected that the CBC Service Selection capability will be implemented. With this capability the ISDN B-channels must (on a per-call basis) support multiple ISDN features and services. The public network CO originates an incoming call by transmitting a call-setup message to the switch. The call-setup message contains a NSF IE that identifies the ISDN feature/service. At the switch, fields 2 through 11 are used to define the various ISDN public network features and services. Table 7-12, *Network Services/Network Features,* lists the currently available AT&T ISDN network services and features and their further defining attributes.

TABLE 7-12. Network Services/Network Features

NAME	Recommended NSV	Parameterized (0) or Binary (1)	Feature (0) or Service (1)	Facility Coding Value
Caller data	8	0	0	8
Out-WATS band	33-288	0	1	1
Operator handled	324	1	0	5
Pre-subscribed CC operator	325	1	0	6
SDN	352	1	1	1
Long distance service	353	1	1	7
MEGACOM 800 service	n/a	n/a	n/a	n/a
MEGACOM	354	1	1	3
In-WATS	355	1	1	4
WATS maximal subscribed band	356	1	1	5
ACCUNET switched digital services	357	1	1	6

*

Field 2 Assigns whether the service/feature is binary (1) or parameterized (0). All codeset NSFs are classified as binary services. As an option, fields 5-11 may contain additional defining parameters (refer to table 7-12, *Network Services/Network Features).* However, even though a service/feature may be defined as parameterized, it is generally not required that fields 5 through 11 be translated.

For a binary service/feature, fields 5-11 cannot be translated.

Field 3 Assigns whether the facility coding value represents a *feature* (0) or a *service* (1). Refer to table 7-12, *Network Services/Network Features.*

Field 4 Assigns the facility coding value. Field encodes and their descriptions are:

- Dash (-), not applicable
- Numbers (refer to table 7-12, *Network Services/Network Features)*

Fields 5-11 There are no default values.

Procedure 309 Word 1: ARS Route Tables

This procedure is used for translating/controlling the Automatic Route Selection feature. Figure 7-50, *Procedure 309 Word 1: ARS Route Tables*, depicts this procedure.

```
ENHANCED MODE — PROCEDURE: 309, WORD: 1
ARS — ROUTE TABLES

 1.                         ARS Plan:  [-]
 2.                   Pattern Number:  [--]
 3.                Preference Number:  [--]
 4.                      Trunk Group:  [---]
 5.         Facility Restriction Level:  [-]
 6.                     Warning Tone:  [-]
 7.           Distant Area Code (NPA):  [---]
 8.                  Send 1 For Toll:  [-]
 9.                 Toll Table Index:  [--]
10.          Number of Digits Deleted:  [-]
11.  Digit Collect (DC) Signal Ignore:  [-]
12.       IXC ISDN Network Identifier:  [---]

Connectedd to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]
enter command:
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-50. Procedure 309 Word 1: ARS Route Tables (Generic 2)

Fields 1-11 The ISDN-PRI does not place any new or additional considerations on translating these fields. The codes/digits translated are generally dependent on each ARS plan and other switch and network considerations. Field 11 is not applicable to ISDN.

Field 12 Specifies the number (designation) of the interexchange carrier (IXC)/ISDN Network Identifier for this trunk group. Permitted field entries may be any number within the range of 0 through 999.

> **NOTE:** The IXC/ISDN network identifier enables the switch to provide equal access capability.

When the trunk group is routed over private network ISDN-PRI transmission facilities, then no IXC/ISDN network is used and the zero `(0)` option must be translated.

Each network provider (of ISDN service) will have a different IXC identifier number. When connecting to AT&T ISDN network facilities, the required number is 288.

Procedure 309 Word 5: ARS–ISDN BCCOS

This procedure is required for translating ISDN trunk groups into the ARS plan.

> **NOTE:** When translating MEGACOM, SDN, and ACCUNET switched digital service calls, you must first assign a network specific facility (NSF) index in field 1 of procedure 279, word 1, and then assign this same index in field 5 of this procedure to all preferences used for these types of calls.

Figure 7-51, *Procedure 309 Word 5: ARS-ISDN BCCOS,* depicts this procedure.

```
                 ENHANCED MODE — PROCEDURE 309, WORD: 5
                  ARS — ISDN AND BEARER CAPABILITY COS

1.                   ARS Plan:   [-]
2.              Pattern Number:  [--]
3.           Preference Number:  [--]
4.     ISDN Dynamic Trunk Type:  [---]
5. ISDN Network Service Value:   [---]
6.         Bearer Capability COS: [---]

Connected to CC0 ON-LINE   [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command: _
[     ] [     ] [F3 DATA] [     ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-51. Procedure 309 Word 5: ARS-ISDN BCCOS (Generic 2)

Fields 1-3 The ISDN-PRI does not place any new or additional considerations on translating these fields. The codes and digits translated are generally dependent on each ARS plan and other switch and network considerations.

Field 4 Translates the ISDN trunk type. The network SERVICE application, and any associated application requirements, will determine the appropriate trunk type. Furthermore, trunk type selection should be coordinated with previous assignments from procedure 100, word 1. Table 7-12, *Network Services/Network Features,* lists the current AT&T network services/network features and (for most applications) the recommended trunk type.

Field 5 Specifies the network service that is requested. Refer to table 7-12, *Network Services/Network Features,* for the appropriate encode.

> **NOTE:** When translating MEGACOM, SDN, and ACCUNET switched digital service calls, you must first assign a network specific facility (NSF) index in field 1 of procedure 279, word 1, and then assign this same index in this field to all patterns used for these types of calls.

Field 6 Assigns a BCCOS to the preference. Permitted numbers include any previously defined BCCOS from procedure 014, word 1.

Procedure 321 Word 1: AAR Tables (Generic 2)

This procedure is used for translating/controlling the Automatic Alternate Routing feature. Figure 7-52, *Procedure 321 Word 1: Automatic Alternate Routing Route Tables (Generic 2),* depicts this procedure.

```
                 ENHANCED MODE — PROCEDURE: 321, WORD: 1
                           AAR — ROUTE TABLES

 1.                    Pattern Number:      [---]
 2.                 Preference Number:      [--]
 3.                       Trunk Group:      [---]
 4.         Facility Restriction Level:     [-]
 5.                      Warning Tone:      [-]
 6.                           Off Net:      [-]
 7.          Number of Digits Deleted:      [-]
 8.  Digit Collect (DC) Signal Ignore:      [-]
 9.                      0xxx Allowed:      [-]
10.        IXC ISDN Network Identifier:     [---]

onnected to CC0 ON-LINE ♡ [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-52. Procedure 321 Word 1: AAR Route Tables (Generic 2)

Fields 1-9 The ISDN-PRI does not place any new or additional considerations or translating these fields. The codes and digits translated depend on each AAR plan and other switch and network considerations.

Field 10 Specifies either the number (designation) of the interexchange carrier (IXC) or the ISDN Network Service Identifier for this trunk group. The IXC/ISDN network identifier enables the switch to provide equal access capability by populating either the NSF IE or the Transit Network Selection IE. If sending an NSF IE and a particular IXC vendor number is specified in this field, that entry is included in the NSF IE. If no IXC vendor number is specified, an is created automatically in the Transit Network Selection IE. Permitted field entries may be any number within the range of 0 through 999.

When a trunk group is routed over a private network ISDN-PRI transmission facility (an IXC/ISDN network is not used), encode 0 must be translated.

Each network provider (of ISDN service) will have a different IXC identifier number. When connecting to AT&T ISDN network facilities, encode 288 must be translated. Numbers in the range 1 through 15 represent IXCs; numbers in the range 16 through 999 are network IDs.

Procedure 321 Word 5: AAR–ISDN and Other Feature Parameters

This procedure is required for transalting ISDN trunk groups into the AAR plan.

> **NOTE:** When translating MEGACOM, SDN, and ACCUNET switched digital service calls, you must first assign a network specific facility (NSF) index in field 1 of procedure 279, word 1, and then assign this same index in field 4 of this procedure to all patterns used for these types of calls.

Figure 7-53, *Procedure 321 Word 5: AAR-ISDN and Other Feature Parameters,* depicts this procedure.

```
ENHANCED MODE — PROCEDURE: 321, WORD: 5
AAR — ISDN AND BEARER CAPABILITY COS

1.            Pattern Number:    [---]
2.         Preference Number:    [--]
3.    ISDN Dynamic Trunk Type:   [---]
4. ISDN Network Service Value:   [---]
5.      Bearer Capability COS:   [---]

Connected to CC0 ON-LINE [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]

enter command:
[ ] [ ] [F3 DATA] [ ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-53. Procedure 321 Word 5: AAR-ISDN and Other Feature Parameters (Generic 2)

Field 1 Specifies the AAR pattern number. Permitted encodes are numbers within the range of 1 through 640.

Field 2 Specifies the AAR preference number. Permitted encodes are sequential numbers within the range of 1 through 16.

Field 3 Translates ISDN trunk type 120 only. Recall that for ISDN applications the trunk type may be translated as fixed (for example, one specific type) or dynamic (which may include those from the fixed category). Generally, the trunk type selected will depend on the network service/feature value, which is translated in field 4. Translates the ISDN trunk type. The network SERVICE application, and any associated application requirements, will determine the appropriate trunk type. Furthermore, trunk type selection should be coordinated with previous assignments from procedure 100, word 1.

Field 4 Specifies the network service requested. Refer to table 7-12, *Network Services/Network Features,* for the appropriate encode.

> **NOTE:** When translating MEGACOM, SDN, and ACCUNET switched digital service calls, you must first assign a network specific facility (NSF) index in field 1 of procedure 279, word 1, and then assign this same index in this field to all patterns used for these types of calls.

Field 5 Assigns a BCCOS to the preference. Permitted numbers include any previously defined BCCOS from procedure 014, word 1. However, BCCOS = 4 is the recommended option.

Procedure 107 Word 1: ISDN Trunk Verification by Terminal, Attendant, and ATMS

This procedure must be translated to support the trunk verification by voice terminal and trunk verification by attendant features over ISDN-PRI facilities. Figure 7-54, *Procedure 107 Word 1: ISDN Trunk Verification by Terminal, Attendant, and ATMS,* depicts this procedure.

```
                ENHANCED MODE — PROCEDURE: 107, WORD:1
                ATMS — TERMINATING TEST LINE ASSIGNMENT

 1.    Trunk Group: [---]
 2. Test Line Type: [--]

TTL TELEPHONE DIGITS
   3.  Digit  1: [-]                  11.  Digit  9: [-]
   4.  Digit  2: [-]                  12.  Digit 10: [-]
   5.  Digit  3: [-]                  13.  Digit 11: [-]
   6.  Digit  4: [-]                  14.  Digit 12: [-]
   7.  Digit  5: [-]                  15.  Digit 13: [-]
   8.  Digit  6: [-]                  16.  Digit 14: [-]
   9.  Digit  7: [-]                  17.  Digit 15: [-]
  10.  Digit  8: [-]                  18.  Digit 16: [-]

DISPLAY ONLY
  19. Trunk Type: [---]

Connected to CC0 ON-LINE  [MAJOR] [MINOR] [RUN TAPE] [BUSY OUT] [IN USE] [WAIT]
enter command: _
[      ] [      ] [F3 DATA] [      ] [F5 HELP] [F6 FIELD] [F7 INPUT] [F8 CMDS]
```

Figure 7-54. Procedure 107 Word 1: ATMS TTL Assignment (System 85 R2V4)

Field 1 Identifies those ISDN-PRI trunk groups to be accessed by the trunk verification features. Permitted encodes are previously defined trunk group numbers within the range of 18 through 999.

Field 2 Dash (-), is appropriate for voice terminal and attendant console applications.

If a transmission test line is used, its type should be specified.

Fields 3-18 Assigns digits for the terminating test line and TVS.

NOTE: Procedure 107, words 2-7, need only be translated whenever ATMS is used.

Procedure 108 Word 1: ISDN Trunk Group TTL Number (Digits)

This procedure is used to assign the terminating test line number (used in test 3 of maintenance procedure 648) that identifies the particular B-channel used for ISDN-PRI testing purposes. This test line number must be assigned for both private and public network configurations. Whether more than one terminating test line number is needed depends on the number of ISDN-PRI links and whether they terminate on more than one switch. Figure 7-55, *Procedure 108 Word 1: ISDN Trunk Group TTL Number (Digits),* depicts this procedure.

```
                 ENHANCED MODE — PROCEDURE: 108, WORD: 1
                   ISDN TERMINATING TEST LINE ASSIGNMENT

 1. Trunk Group: [---]

TERMINATING TEST LINE TELEPHONE DIGITS
   2. Digit 1: [-]                      10. Digit 9: [-]
   3. Digit 2: [-]                      11. Digit 10: [-]
   4. Digit 3: [-]                      12. Digit 11: [-]
   5. Digit 4: [-]                      13. Digit 12: [-]
   6. Digit 5: [-]                      14. Digit 13: [-]
   7. Digit 6: [-]                      15. Digit 14: [-]
   8. Digit 7: [-]                      16. Digit 15: [-]
   9. Digit 8: [-]                      17. Digit 16: [-]

DISPLAY ONLY
  18. Trunk Type: [---]

Connected to CC0 ON-LINE | MAJOR | MINOR | RUN TAPE | BUSY OUT | IN USE | WAIT
enter command:
|  |  | F3 DATA |  | F5 HELP | F6 FIELD | F7 INPUT | F8 CMDS |
```

Figure 7-55. Procedure 108 Word 1: ISDN Trunk Group TTL Assignment (Generic 2)

Field 1 Translates the trunk group that identifies the ISDN terminating test line. The terminating test line is required for B-channel maintenance testing.

> **NOTE:** As part of the installation and ISDN-PRI services provisioning, the terminating test line number assignment must be coordinated with the terminating switch.

Fields 2-17 Assigns digits for the terminating test line.

NOTE: If B-channel signaling control is used on the D-channel of another facility, you must use NFAS (see procedures 260, word 1; 262, word 1; 262, word 2; and 262, word 3).

SYSTEM 75 (R1V2 AND R1V3)

System 75 has the same facility considerations (framing, signaling, line coding format, etc.) as System 85 or Generic 2 and many similar equipment considerations (both require an additional clock circuit pack for synchronization). The main differences are in terms of administration methods (screens for System 75 versus procedures for System 85), and for some fields a difference in terminology. The primary equipment differences are:

- No synchronization cables are required.
- Line compensation is translated in software rather than set by DIP switches.

All screens shown have their fields depicting default or recommended options.

Service/Facility Options

The DS1 CIRCUIT PACK screen is used to define characteristics of a DS1 facility.

> **NOTE:** This screen requires that the circuit pack (TN722/TN722B) have been previously assigned to an equipment location (carrier and slot) by the CIRCUIT PACK ADMINISTRATION screen.

Figure 7-56, *DS1 Circuit Pack Screen,* depicts this procedure.

```
                              DS1 CIRCUIT PACK                  Page 1 of 1

             Location: ____                         Name: ____________
    Line Compensation: 1             Zero Code Suppresion: zcs
          Framing Mode: esf                Signaling Mode: common-chan
              DMI-BOS? y

                           MAINTENANCE PARAMETERS

      Slip Detection? n           Remote Loop-Around Test? n
```

Figure 7-56. DS1 Circuit Pack Screen

Location A display-only field specifying the carrier and slot of a DS1.

Name The name as shown on the network diagram.

Line Compensation Refers to the distance between the switch and the NCTE, CDM, CEM, DSX-1 cross-connect, T1 office repeater, or other equipment. The compensation setting is for the total distance between the switch and the endpoint. Table 7-13, *Line Compensation Settings*, shows compensation values for various distances.

TABLE 7-13. Line Compensation Settings

Compensation Value	Distance (Feet)
1	000 to 133
2	133 to 266
3	266 to 399
4	399 to 533
5	533 to 655

NOTE: Compensation values assume 22-gauge ABAM or 24-gauge PDS cables. Two colocated switches can be up to 1310 feet apart with compensation on both systems set to the maximum values. If 26-gauge PDS cables are used, distances are reduced as shown in table 3-7, *System 85 Traditional Module Equalizer Settings (Metallic Cable).*

The T1 office repeaters or T1 line repeaters can be used when the on-premises distance limitation is exceeded. A T1 office repeater is required at each end of the connection to provide an interconnection range of up to 3000 feet. Each repeater only provides regeneration for the receive direction. The T1 line repeaters can be used to accommodate distances up to 6000 feet between switches. The T1 line repeaters can be used in tandem to accommodate greater distances.

Zero Code Suppression Assigns the line coding format (ZCS or B8ZS) that will be used to forcibly ensure that the data meets T1-carrier ones-density requirements. The same considerations regarding the choice of data rates, communications protocol, and facility requirements that were discussed under System 85 procedure 260, field 9, apply here.

Framing Mode The choices are D4 or ESF (previously called F_e). The network diagram should show the choice for the particular DS1/T1-span. The other end and all intermediate equipment should be optioned accordingly.

Signaling Mode

The default option is common-channel. This option is the same as 24th-channel or AVD for System 85. The alternate choice is robbed-bit. The choice of signaling mode used is dependent on the application.

Common-channel signaling multiplexes all signaling information for channels 1-23 into the 24th-channel. This makes available the full 64K-bps bandwidth (of channels 1-23) for voice and/or digital data transmission. This capability is sometimes called Alternate Voice Data (AVD).

The term AVD is a software attribute for a trunk. AVD allows pure 64K-bps digital data to be transmitted over those DS1 trunks that use 24th-channel signaling. Although AVD trunks are designed for digital data transmission they may also be used for voice and voice-grade data transmission. However, a pooled modem is required to transmit voice-grade data over AVD trunks.

CAUTION Due to a change in the evolving DS1/DMI protocol specification, two methods for providing 24th-channel signaling exist. The two methods are not compatible with each other. The earlier method is known as the AT&T proprietary format (conventional T1 test equipment cannot analyze it). This latter version is known as the DMI-BOS format (T1 test equipment can analyze this format).

Either the AT&T proprietary format or the DMI-BOS format, depending on the circuit pack configuration, may be used with another System 75 or System 85. The DMI-BOS format is required to provide 24th-channel signaling capability with other vendors' digital switches. Common-channel signaling (both methods) are not compatible with channel banks and multiplexers.

CAUTION The TN722 circuit pack provides the AT&T proprietary format; the circuit pack does not provide DMI-BOS. The TN722B circuit pack may be administered to provide either the proprietary format or DMI-BOS format.

DMI-BOS

Assigns the DS1's format. Field encodes and their descriptions are:

n AT&T proprietary. This option assumes that common-channel signaling is selected; otherwise, RBS is used.

y DMI. This option is equivalent to a 1 in field 14 of procedure 260.

Maintenance Options or Parameters

Slip Detection This option enables (y) or disables (n) switching between the primary, secondary, and internal high-accuracy clock. The decision to switch from one source to the other is based on an internal slip count calculation.

> **NOTE:** Those DS1/T1 facilities that are used to provide the primary and secondary synchronization reference should be administered for slip detection `y`. Typically, those other DS1/T1 spans that are used for data applications and deemed important should also be administered for slip detection. All T1-spans connecting channel banks are excluded, unless the channel bank is externally timed. Normally, DS1/T1 spans that are used exclusively for voice and which are not assigned as the primary or secondary synchronization source should be administered for slip detection `n`. Refer to the network synchronization diagram to determine which option to choose.

The digital switch maintains a slip count record for each DS1. The slip count is used to determine if the T1-span is experiencing errors and, if so, the severity of the errors (type alarm). Option `y` enables switching between the primary, secondary, or internal high-accuracy clock. If as many as 50% of those spans that are administered for slip detection are experiencing slips (with respect to the primary), then a decision is made to switch to the secondary.

Option `y` is equivalent to a `1` in field 10 of procedure 260.

Remote Loop Around Option `y` is only used during some phases of DS1/DMI diagnostic testing. The normal or operational choice is `n`. Option `n` is equivalent to a `0` in field 11 of procedure 260.

Network Synchronization Options

The SYNCHRONIZATION PLAN screen is used to specify which of the two DS1/T1-spans (that were previously administered with slip detection `y`) is the primary reference source and which is the secondary reference source. Figure 7-57, *Synchronization Plan Screen,* depicts this procedure.

```
                         SYNCHRONIZATION PLAN                Page 1 of 1

             SYNCHRONIZATION SOURCE (DS1 circuit pack location)

                  Primary: ___        Secondary: ___

                              DS1 CIRCUIT PACKS

 Location   Name            Slip           Location   Name            Slip

 ___   _______________   _              ___   _______________   _
 ___   _______________   _              ___   _______________   _
 ___   _______________   _              ___   _______________   _
 ___   _______________   _              ___   _______________   _
```

Figure 7-57. Synchronization Plan Screen

Primary The 3-character location of the circuit pack that is the primary synchronization reference.

> **NOTE:** The primary will be one of those DS1 circuit packs that has previously been administered with slip detection `y.` The *Location, Name,* and *Slip* (actually slip detection) fields list the DS1 circuit packs administered on the DS1 CIRCUIT PACK screen. The primary and secondary source must be selected from this list.

Secondary The 3-character location of the circuit pack that is the secondary synchronization reference.

There is no requirement that a secondary source be provided. However, it is a good practice.

The Command Line Feature set provides four executable commands for controlling and monitoring synchronization. They are:

- Disable
- Enable
- Status
- Set

Network Facilities — ISDN-PRI Applications

This screen is, from the user perspective, display only. However, the Customer Support Service Organization (CSSO) may administer (add) new services or features as required. In terms of comparison, this screen is somewhat equivalent to procedure 279, word 1. Figure 7-58, *Network-Facilities Screen,* depicts this procedure.

```
                              NETWORK-FACILITIES
    Predefined  Services/Features

                        Facility                                 Facility
      Name           Type   Coding                   Name       Type  Coding

     outwats-bnd       1     00001             megacom-800       1    00010
     operator          0     00101             megacom           1    00011
     sub-operator      0     00110             inwats            1    00100
     sdn               1     00001             wats-max-bnd      1    00101
     accunet           1     00110             lds               1    00111
     1800              1     01000             multiquest        1    10000

    Additional  Services/Features

                        Facility                                 Facility
      Name           Type   Coding                   Name       Type  Coding

     _____________     _    ______             _____________     _    ______
     _____________     _    ______             _____________     _    ______
     _____________     _    ______             _____________     _    ______
     _____________     _    ______             _____________     _    ______
```

Figure 7-58. Network-Facilities Screen

Name — Up to 15 alphanumeric characters that uniquely identify (by name) the *Service* or *Feature.*

Facility Type — The ISDN-PRI specification requires that each network capability be identified as either a *feature* (0), or *service* (1).

Facility Coding — The ISDN-PRI specification further requires that each service or feature be identified as a:

- Parameterized Service
- Parameterized Feature
- Binary Service
- Binary Feature

Since two new user defined facility names and codes have been added to System 75 R1V5, a conflict might occur when a R1V4 user translation with user defined services or features is upgraded to R1V5 translation. Table 7-14, *R1V4 to R1V5 Translation Upgrade Strategy,* describes a strategy to resolve this conflict.

TABLE 7-14. R1V4 to R1V5 Translation Upgrade Strategy

R1V4 User Defined		Translation Upgrade Strategy	Note
Facility Name	**Facility** Code(1)		
i800	01000	Remove from user defined table	2
i800	not 01000	Remove from user defined table	3
not (i800 or multiquest)	01000	Preserve in user defined table	4
not (i800 or multiquest)	not 01000	Preserve in user defined table	2
multiquest	10000	Remove from user defined table	2
multiquest	not 10000	Remove from user defined table	5
not (i800 or multiquest)	10000	Preserve in user defined table	6
not (i800 or multiquest)	not 10000	Preserve in user defined table	2

NOTES:

1. The Facility Code includes "Facility Type" and "Facility Coding."
2. No changes in the behavior on incoming and outgoing calls.
3. An incoming call with this user defined code point will no longer be recognized. For an outgoing call that used this code point, use the `101000` (i800) code point.
4. An outgoing call will behave the same. For an incoming call, it is treated like i800.
5. An incoming call with this user defined code point is no longer recognized. For an outgoing call that used this code point, use the `110000` (multiquest) code point.
6. An outgoing call will behave the same. For an incoming call, it is treated like multiquest.

Trunk Group/Trunk Group Members

For System 75 R1V2 and R1V3, there are three applications for a DS1 (tie and DMI); refer to table 7-6, *Equipment Parameters and Permitted Translation Encodes.*

Tie Trunks

The DS1 tie trunks are defined by using Page 1 of the TRUNK GROUP screen; this is the same as for analog tie trunk groups. Trunk members are added to the GROUP MEMBER ASSIGNMENTS screen (pages 2 through 5). This series of screens administers many of the same parameters as procedures 100 and 101 do for System 85. Figure 7-59, *Trunk Group Screen, Page 1 (Tie Trunk Group),* depicts this procedure.

```
                          TRUNK GROUP                    Page 1 of 11

  Group Number: ___          Group Type: tie        SMDR Reports? y
    Group Name: OUTSIDE CALL        COR: 1                  TAC: 114
     Direction: two-way  Outgoing Display? n      Data Restriction? n
  MIS Measured? n
   Dial Access? y          Busy Threshold: 99       Night Service: ____
  Queue Length: 0          Internal Alert? n  Incoming Destination: _
     Comm Type: voice           Auth Code? n

TRUNK PARAMETERS

 Trunk Type (in/out): ____________   Incoming Rotary Timeout (sec): 5_
  Outgoing Dial Type: tone ____                Incoming Dial Type: tone_

     Digit Treatment: __________                           Digits: _____
   Connected to Toll? n      STT Loss: normal      DTT to DCO Loss: normal
  Incoming Dial Tone? y
         Bit Rate: 1200      Synchronization: async      Duplex: full
Answer Supervision Timeout? 10
```

Figure 7-59. Trunk Group Screen, Page 1 (Tie Trunk Group)

Most fields require no unusual entries for DS1 tie trunk applications. Only those that may require special attention are mentioned.

Comm Type The default is *voice* with *avd* and *data* being the alternate selections.

> **NOTE:** Trunk groups that are administered avd require that the DS1 also be administered for common-channel signaling (24th). Furthermore, if avd is translated; then *Bit Rate, Synchronization,* and *Duplex* fields are displayed. These three fields enable the trunk group to function with a modem pool. A *Data Originate code* is required to start a modem pool call. The avd option is equivalent to translating System 85 procedure 101, field 17, with a `1`.

Trunk Type (in/out) Establishes the physical type of incoming and outgoing trunks. For tie trunk applications, field encodes and their descriptions are:

- Auto
- Immed-start
- Wink-start
- Delay-dial

Figure 7-60, *Trunk Group Screen, Page 2 (Tie Trunk Group),* depicts this procedure.

```
                      GROUP MEMBER ASSIGNMENTS          Page 2 of 5

          Port   Name       Mode       Type       Answer  Delay

     1:  _____  _______  ________  ______     __________
     2:  _____  _______  ________  ______     __________
     3:  _____  _______  ________  ______     __________
     4:  _____  _______  ________  ______     __________
     5:  _____  _______  ________  ______     __________
     6:  _____  _______  ________  ______     __________
     7:  _____  _______  ________  ______     __________
     8:  _____  _______  ________  ______     __________
     9:  _____  _______  ________  ______     __________
    10:  _____  _______  ________  ______     __________
    11:  _____  _______  ________  ______     __________
    12:  _____  _______  ________  ______     __________
    13:  _____  _______  ________  ______     __________
    14:  _____  _______  ________  ______     __________
    15:  _____  _______  ________  ______     __________
```

Figure 7-60. Trunk Group Screen, Page 2 (Tie Trunk Group)

Port This field associates each trunk group member to a particular carrier (A-E), slot (01-20), and circuit (01-24).

> **NOTE:** System 75 does not have the same DS1 circuit pack slot restrictions as System 85. However, trunk group member assignments should match the DS1 channel assignments (for example, trunk group member 1 on channel 1) and maintain this procedure as long as possible.

Name This field does not apply to PRI.

Mode For DS1 tie trunk applications, the default and only permitted entry is `e&m.`

Type For DS1/DMI applications, the default is `T1 stan` (T1 standard). Normally, this field is not administered. The default value is appropriate.

Answer Delay Allowable entries (in milliseconds) range from 20 to 5100 in intervals of 20. This field should only be translated if delay-dial were optioned.

DS1/DMI Trunks

The DS1/DMI trunks are defined by using the TRUNK GROUP screen. This screen is somewhat equivalent to System 85 procedure 260, field 14, encode `1.` Figure 7-61, *Trunk Group Screen, Page 1 (DMI)*, depicts this procedure.

```
                              TRUNK GROUP                   Page 1 of 5

      Group Number: ____           Group Type: dmi        SMDR Reports? y
        Group Name: OUTSIDE CALL        COR: 1                    TAC: ____
         Direction: two-way   Outgoing Display? n
       Dial Access? y           Busy Threshold: 60        Night Service: ____
      Queue Length: 0                             Incoming Destination: ____

    TRUNK PARAMETERS

      Trunk Type (In/out): ___________  Incoming Rotary Timeout (sec): 5
      Outgoing Dial Type: tone                     Incoming Dial Type: tone
                                              Disconnect Timing (msec): 500
         Digit Treatment: __________                           Digits: _____
          ACA Assignment? n               Long Holding Time (hours): 1
   Short Holding Time (secs.): 10          Short Holding Threshold: 15
                Bit Rate: 1200     Synchronization: async    Duplex: full
       Incoming Dial Tone? y                       Maintenance Test? y
   Answer Supervision Timeout: ____               Suppress # Outpulsing? y
```

Figure 7-61. Trunk Group Screen, Page 1 (DMI)

This screen is similar to the one for administering tie trunks. The primary difference is related to data capabilities (Bit Rate, Synchronization, and Duplex). (Bit rate and data rate mean the same for System 75 applications.)

ISDN-PRI Trunks

The ISDN-PRI trunks are defined by using the TRUNK GROUP screen. An enhancement for R1V4 and R1V5 is ISDN call-by-call service selection. that allows a group of ISDN B-Channels to be designated to carry calls to a variety of switched nodal services (such as SDN, MEGACOM, MEGACOM 800) and/or carry calls destined for different Interexchange Carriers (such as AT&T and GTE). Information elements passed between the switch and the public switched network in the initial call setup message dynamically determine the feature and/or service to be provided by the network on a call-by-call basis.

The ability to carry calls to a variety of switched nodal services takes advantage of call-by-call service selection. You must specify a `cbc` trunk type to connect with this offering. You can then define *usage allocations* to apportion a minimum and maximum number of members to CBC trunk groups for specific services and vary them based on the time-of-day and day-of-week. You can also define incoming call handling treatments (ICHT) based on incoming service/feature and incoming called number as:

- Enhanced digit manipulation
- Request of CPN/BN (Calling Party Number/Billing Number) (formerly SID/ANI) on a call by call basis
- Night destination

Figures 7-62, *Trunk Group Screen, Page 1 (ISDN-PRI Trunk Group)*, 7-63, *Trunk Group Screen, Page 2 (ISDN-PRI Trunk Group)*, 7-64, *Trunk Group Screen, Page 3 (CBC Usage)*, 7-65, *Trunk Group Screen, Page 4 (CBC Usage)*, and 7-66, *Routing Pattern Screen* depict this procedure.

```
                                TRUNK GROUP                      Page 1

Group Number:____             Group Type: isdn-pri   SMDR Reports? y
  Group  Name: OUTSIDE  CALL           COR : 1               TAC:____
   Direction: two-way  Outgoing Display? n
 Dial Access? y          Busy Threshold: 60       Night Service: ____
Queue Length: 0
Service Type: cbc              Auth Code? n

 Usage Alloc? n         Far End Test No: _______________


TRUNK PARAMETERS

         Loss Plan: pbx-eia                     Digital Conn Loss: normal

          Bit Rate: 1200    Synchronization: async        Duplex: full
```

Figure 7-62. Trunk Group Screen, Page 1 (ISDN-PRI Trunk Group)

```
TRUNK FEATURES                                                    Page 2
         ACA Assignment? n

           MIS Measured? n                   Internal Alert ? n
           Used for DCS? n                 Data Restriction? n
      Maintenance Tests? y                          Send CPN? n
                                                   Send Name? n

   Service/     Called    Called        Del      Insert        Per Call  Night
   Feature       Len      Number                                CPN/BN   Serv
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
 ______________  __  ______________     ___  ______________   ________ _______
```

Figure 7-63. Trunk Group Screen, Page 2 (ISDN-PRI Trunk Group)

```
                          CBC Trunk Group Usage Allocation

 Trunk Allocation Plan 1    Trunk Allocation Plan 2    Trunk Allocation Plan 3

    Service/  Min#  Max#       Service/  Min#  Max#       Service/  Min#  Max#
    Feature   Chan  Chan       Feature   Chan  Chan       Feature   Chan  Chan

 ___________   __    __    ___________   __    __    ___________   __    __
 ___________   __    __    ___________   __    __    ___________   __    __
 ___________   __    __    ___________   __    __    ___________   __    __
 ___________   __    __    ___________   __    __    ___________   __    __
 ___________   __    __    ___________   __    __    ___________   __    __
 ___________   __    __    ___________   __    __    ___________   __    __
 ___________   __    __    ___________   __    __    ___________   __    __
 ___________   __    __    ___________   __    __    ___________   __    __
 ___________   __    __    ___________   __    __    ___________   __    __
 ___________   __    __    ___________   __    __    ___________   __    __
```

Figure 7-64. Trunk Group Screen, Page 3 (CBC Usage)

```
            CBC Trunk Group Usage Allocation Plan Assignment Schedule

Usage Method:

                              Fixed? y      Allocation Plan Number: 1
     Scheduled? n

Usage Allocation Plan Activation Schedule:

          Act  Pln    Act  Pln    Act  Pln    Act  Pln    Act  Pln    Act  Pln
          Time  #     Time  #     Time  #     Time  #     Time  #     Time  #

Sun       __:__ _     __:__ _     __:__ _     __:__ _     __:__ _     __:__ _
Mon       __:__ _     __:__ _     __:__ _     __:__ _     __:__ _     __:__ _
Tue       __:__ _     __:__ _     __:__ _     __:__ _     __:__ _     __:__ _
Wed       __:__ _     __:__ _     __:__ _     __:__ _     __:__ _     __:__ _
Thu       __:__ _     __:__ _     __:__ _     __:__ _     __:__ _     __:__ _
Fri       __:__ _     __:__ _     __:__ _     __:__ _     __:__ _     __:__ _
Sat       __:__ _     __:__ _     __:__ _     __:__ _     __:__ _     __:__ _
```

Figure 7-65. Trunk Group Screen, Page 4 (CBC Usage)

```
                          Routing Pattern Number: 1

Pattern Assignments (Enter Up To 6)

   Grp  FRL NPA Prefix Toll  No. Del.  Inserted                          IXC
   No.             Mark List  Digits    Digits
1. ___  _   ___   _    __     __     ______________________________     ___
2. ___  _   ___   _    __     __     ______________________________     ___
3. ___  _   ___   _    __     __     ______________________________     ___
4. ___  _   ___   _    __     __     ______________________________     ___
5. ___  _   ___   _    __     __     ______________________________     ___
6. ___  _   ___   _    __     __     ______________________________     ___

Supplemental ISDN Routing Information

    BCC VALUE    Service/Feature
    0 1  2 3 4
1.  _ _ _ _ _   _______________   Band: ___
2.  _ _ _ _ _   _______________   Band: ___
3.  _ _ _ _ _   _______________   Band: ___
4.  _ _ _ _ _   _______________   Band: ___
5.  _ _ _ _ _   _______________   Band: ___
6.  _ _ _ _ _   _______________   Band: ___
```

Figure 7-66. Routing Pattern Screen

GENERIC 1

Generic 1 has the same DS1 facility considerations (such as framing, signaling, line coding format) as System 75. It also requires the additional clock circuit pack for synchronization. The main significant difference between a System 75 and Generic 1 is support of the TN767 circuit pack for both DS1/DMI and ISDN-PRI.

Depending on whether a Generic 1 provides private network ISDN service or public network ISDN services, whether the switch functions as an endpoint or as a tandem node, will determine whether other features or screens should be administered with ISDN-PRI. Primarily, these other features and screens include:

1. AAR/ARS
2. Ten- to seven-digit conversion
3. DCS/uniform dialing plan
4. Call-by-Call Service Selection
5. SID prefix assignments
6. Routing patterns
7. Nonfacility Associated Signaling (NFAS) and D-channel backup

The SYSTEM-PARAMETERS CUSTOMER-OPTIONS screen displays these and other optional features. New switches should come with the appropriate optional features already enabled. Switch upgrades (depending on the specifics) may require that the CSSO alter the SYSTEM-PARAMETERS CUSTOMER-OPTIONS screen.

DS1 Circuit Pack Options

The DS1 CIRCUIT PACK screen is used to define characteristics of the DS1 facility. This screen requires that the circuit pack (TN722/TN767) have been previously assigned to an equipment location (carrier and slot) by the CIRCUIT PACK ADMINISTRATION screen. For ISDN-PRI applications, the screen has minor differences. Therefore, two screens are depicted. The first is for DS1/DMI-BOS and the second is for ISDN-PRI.

Screens are shown with default or recommended field options. Figures 7-67, *DS1 Circuit Pack Screen, Common-Channel Signaling,* 7-68 *DS1 Circuit Pack Screen, ISDN-PRI Signaling,* and 7-69 *DS1 Circuit Pack Screen, ISDN-EXT Signaling* depict the three possible ways to use this procedure.

```
                         DS1 CIRCUIT PACK            Page 1 of 1

          Location: ____                          Name: __________
 Line Compensation: 1           Zero Code Suppression: zcs
      Framing Mode: esf                Signaling Mode: common-chan
          DMI-BOS? y

                       MAINTENANCE PARAMETERS

    Slip Detection? n          Remote Loop-Around Test? n
```

Figure 7-67. DS1 Circuit Pack Screen, Common-Channel Signaling

```
                         DS1 CIRCUIT PACK            Page 1 of 1

          Location: ____                          Name: _____________
 Line Compensation: 1           Zero Code Suppression: zcs
      Framing Mode: esf                Signaling Mode: isdn-pri
                                              Connect: pbx
                                            Interface: user

                       MAINTENANCE PARAMETERS

    Slip Detection? n          Remote Loop-Around Test? n
```

Figure 7-68. DS1 Circuit Pack Screen, ISDN-PRI Signaling

```
                         DS1 CIRCUIT PACK          Page 1 of 1

          Location: ____                      Name: _______________
Line  Compensation:  1         Zero Code Suppression: b8zs
      Framing Mode: esf              Signaling Mode: isdn-ext

                      MAINTENANCE  PARAMETERS

     Slip Detection? n        Remote Loop-Around Test? n
```

Figure 7-69. DS1 Circuit Pack Screen, ISDN-EXT Signaling

Service/Facility Options

Location A display-only field specifying the carrier and slot of the DS1 Interface.

Name The name as assigned on the network diagram.

Line Compensation Refers to the distance between the switch and the network channel-terminating equipment (NCTE), CDM, CEM, DSX-1 cross-connect, T1 office repeater, or other equipment. The compensation setting is for the total distance between the switch and the endpoint. Table 7-15, *Line Compensation Values,* summarizes compensation.

TABLE 7-15. Line Compensation Values

Compensation Value	Distance (Feet)
1	000 to 133
2	133 to 266
3	266 to 399
4	399 to 533
5	533 to 655

NOTE: Compensation values assume 22-gauge ABAM or 24-gauge PDS cables. Two colocated switches can be up to 1310 feet apart with compensation on both systems set to the maximum values. If 26-gauge PDS cables are used, distances are reduced as shown in table 3-1, *System 85 Traditional Module Equalizer Settings (Metallic Cable).*

The T1 office repeaters or T1 line repeaters can be used when the on-premises distance limitation is exceeded. A T1 office repeater is required at each end of the connection to provide an interconnection range of up to 3000 feet. Each repeater only provides regeneration for the receive direction. The T1 line repeaters can be used to accommodate distances up to 6000 feet between switches. The T1 line repeaters can be used in tandem to accommodate greater distances.

Zero Code Suppression Specifies the line coding format (ZCS or B8ZS) that will be used to forcibly ensure that the data meets T1-carrier ones-density requirements. The choice of data rates, communications protocol, and facility requirements discussed under System 85 procedure 260, field 9, also apply here.

Framing Mode The choices are `D4` or `ESF` (previously called F_e). The network diagram should show the choice for the particular DS1/T1-span. The other end and all intermediate equipment should be optioned accordingly.

Signaling Mode

The default option is common-channel. This option is the same as 24th-channel or AVD for System 85. The alternate choices are ISDN-PRI and robbed-bit.

If ISDN-PRI is optioned, then the *DMI-BOS* field disappears and the *Connect* field appears. The choice of signaling mode used is dependent on the application.

If ISDN-EXT is optioned (Generic 1 R1V5 only), the *DMI-BOS* field disappears (D-channel related fields do not appear). This option assings FAS/NFAS to this DS1 and D-channel related data are administered in the SIGNALING GROUP screen.

Common-channel signaling multiplexes all signaling information for channels 1-23 into the 24th-channel. This makes the full 64K-bps bandwidth of channels 1-23 available for voice and/or digital data transmission. This capability is sometimes called Alternate Voice Data (AVD).

The term **AVD** is a software attribute for a trunk. It (AVD) allows pure 64K-bps digital data to be transmitted over those DS1 trunks that use 24th-channel signaling. Although AVD trunks are designed for digital data transmission they may also be used for voice and voice-grade data transmission. However, a pooled modem is required to transmit voice-grade data over AVD trunks.

CAUTION

Due to a change in the evolving DS1/DMI protocol specification, two methods for providing 24th-channel signaling exist. The two methods are not compatible with each other. The earlier method is known as the AT&T proprietary format (conventional T1 test equipment cannot analyze it). This latter version is known as the DMI-BOS format (T1 test equipment can analyze this format).

Either the AT&T proprietary format or the DMI-BOS format, depending on the circuit pack configuration, may be used with another System 75 or System 85. The DMI-BOS format is required to provide 24th-channel signaling capability with other vendors' digital switches. Common-channel signaling (both methods) are not compatible with channel banks and multiplexers.

CAUTION

The TN722 circuit pack provides the AT&T proprietary format; the circuit pack does not provide DMI-BOS. The TN722B/TN767 circuit pack may be administered to provide either the proprietary format or DMI-BOS format.

DMI-BOS

Assigns the DS1 format. Field encodes and their descriptions are:

n AT&T proprietary. This option assumes that common-channel signaling is selected; otherwise, RBS is used.

y DMI. This option is equivalent to a 1 in field 14 of procedure 260.

Connect This field is not available unless the *Signaling Mode* field is translated `isdn-pri.` Field encodes and their descriptions are:

- `network` (default option) — implies that the Generic 1 will function as user side and the switch connects to the ISDN-PRI public network facilities.
- `pbx` — implies that a Generic 1 will connect to ISDN-PRI private network facilities.
- `host` — implies that a Generic 1 will function as network side and the switch connects to a host computer (which is always user side).

Interface This field is not available unless the *Connect* field is translated `pbx.` Field encodes and their descriptions are:

- `user` (default option)
- `network`

NOTE: For ISDN-PRI private network connections, additional care must be exercised in defining user and network sides. Specifically, only one end must be administered user side, while the alternate must be defined as network side. If the private network node is a tandem switch, then that node may function as both user side and network side depending on the particular facility.

Maintenance Options or Parameters

Slip Detection This option enables (y) or disables (n) switching between the primary, secondary, and internal high-accuracy clock. The decision to switch from one source to the other is based on an internal slip count calculation.

NOTE: Those DS1/T1 facilities that are used to provide the primary and secondary synchronization reference should be administered for slip detection `y.` Typically, those other DS1/T1 spans that are used for data applications and deemed important should also be administered for slip detection. All T1-spans connecting channel banks are excluded, unless the channel bank is externally timed. Normally, those DS1/T1 spans used exclusively for voice and not assigned as the primary or secondary synchronization source should be administered for slip detection of `n.` Refer to the network synchronization diagram to determine which option to choose.

The digital switch maintains a slip count record for each DS1 Interface. The slip count is used to determine if the T1-span is experiencing errors and, if so, the severity of the errors (type alarm). Option `y` enables switching between the primary, secondary, or internal high-accuracy clock.

NOTE: If as many as 50% of those spans that are administered for slip detection are experiencing slips (with respect to the primary), then a decision is made to switch to the secondary.

Option `y` is equivalent to a `1` in field 10 of procedure 260.

Remote Loop Around Option `y` is only used during some phases of DS1/DMI diagnostic testing. The normal or operational choice is `n.` Option `n` is equivalent to a `0` in field 11 of procedure 260.

Network Synchronization Options — DS1 and ISDN-PRI Applications

The SYNCHRONIZATION PLAN screen is used to specify which of the two DS1/T1-spans (previously administered with slip detection `y`) is the primary reference source and which is the secondary reference source. Figures 7-70, *Synchronization Plan Screen, Stratum 3,* and 7-71, *Synchronization Plan Screen, Stratum 4,* depict this procedure.

```
                    SYNCHRONIZATION PLAN              Page 1 of 1

     SYNCHRONIZATION SOURCE (DS1 circuit pack location)

          Stratum: 3
     Port Network: 1
```

Figure 7-70. Synchronization Plan Screen, Stratum 3

```
                        SYNCHRONIZATION PLAN              Page 1 of 2

          SYNCHRONIZATION SOURCE (DS1 circuit pack location)

               Stratum: 4
               Primary: ____        Secondary: ____

                            DS1 CIRCUIT PACKS

Location   Name       slip               Location   Name       slip

___   _______________  _               ___   _______________  _
___   _______________  _               ___   _______________  _
___   _______________  _               ___   _______________  _
___   _______________  _               ___   _______________  _
___   _______________  _               ___   _______________  _
___   _______________  _               ___   _______________  _
___   _______________  _               ___   _______________  _
___   _______________  _               ___   _______________  _
___   _______________  _               ___   _______________  _
___   _______________  _               ___   _______________  _
```

Figure 7-71. Synchronization Plan Screen, Stratum 4

Stratum The stratum level used for synchronization. Options are:

- `3` Stratum 3 clock. If this option is used, the remainder of the screen disappears and the *Port Network* field appears.

  NOTE: A TN780 circuit pack must be used when selecting the stratum 3 clock option.

- `4` Stratum 4 clock (default)

Port Network When a stratum 3 clock is selected in the *Stratum* field, this field is used to specify which port network (`1, 2,` or `3)` containing a stratum 3 clock will be used as the synchronization source. This field does not appear when a stratum 4 clock is selected in the *Stratum* field.

Primary The 3-character location of the circuit pack that is the primary synchronization reference.

NOTE: The primary will be the DS1 circuit pack administered with slip detection `y.` The *location*, *name*, and *slip* (that is, slip detection) fields list the DS1 circuit packs that have been administered on the DS1 CIRCUIT PACK screen. The primary and secondary source must be selected from this list.

Secondary The 3-character location of the circuit pack that is the secondary synchronization reference. There is no requirement that a secondary source be provided. However, it is a good practice.

The Command Line Feature set provides four executable commands for controlling and monitoring synchronization. They are:

- Disable
- Enable
- Status
- Set

Trunk Group/Trunk Group Members — DS1 Trunk Applications

For DS1/DMI applications the TN722 circuit pack emulates three categories of trunk types, while the TN767 circuit pack emulates three additional trunk types; refer to table 6-1, *Supported Digital Facilities.*

DS1/DMI trunking applications are defined by using page 1 and page 2 of the TRUNK GROUP screen; this is the same as for analog trunk groups. Trunk members are added to the GROUP MEMBER ASSIGNMENTS screen (pages 3 through 9). This series of screens administers many of the same parameters as procedures 100 and 101 do for Generic 2. Figure 7-72, *Trunk Group Screen, Page 1 (Tie)*, depicts this procedure.

```
                              TRUNK GROUP                  Page 1 of 9

     Group Number:___            Group Type:  tie       SMDR Reports? y
       Group Name: OUTSIDE CALL          COR: 1

TAC:  _
        Direction: two-way  Outgoing Display? n
      Dial Access? y          Busy Threshold: 99      Night Service: ____
     Queue Length: 0                               Incoming Destination:_
        Comm Type: avd             Auth Code? n                  BCC: 0

   TRUNK PARAMETERS
     Trunk Type (in/out): ____________    Incoming Rotary Timeout (sec): 5
      Outgoing Dial Type: tone                     Incoming Dial Type: tone
                                           Disconnect Timing (msec): 500
         Digit Treatment: __________                           Digits: _____
       Connected to Toll? n     STT Loss: normal      DTT to DCO Loss: normal
      Incoming Dial Tone? y
                Bit Rate: 1200              Synchronization: async
                  Duplex: full    Answer Supervision Timeout? 10
```

Figure 7-72. Trunk Group Screen, Page 1 (Tie)

Most fields require no unusual entries for DS1 service applications. Only those fields that may require special attention are mentioned.

Comm Type The default is *voice* with *avd* and *data* being the alternate selections.

> **NOTE:** Trunk groups that are administered `avd` require that the DS1 Interface also be administered for common-channel signaling (24th). Furthermore, if `avd` is translated; then the *baud rate, synchronization,* and *duplex* fields are displayed. These three fields enable the trunk group to function with a modem pool. A "Data Originate code" is required to start a modem pool call.

BCC This field is only displayed when *ISDN-PRI* is enabled on the SYSTEM PARAMETERS CUSTOMER-OPTIONS screen and when the *Communications Type* field is administered *avd* or *data.*

Trunk Type (in/out) Establishes the physical type of incoming and outgoing trunks. For tie trunk applications, field encodes and their descriptions are:

- Auto
- Immed-start
- Wink-start
- Delay-dial

With System 75, the digital loss plan is administered by entering a code with the *Group Name* field. With Generic 1, the digital loss plan is administered with the following three fields.

Connect to Toll The default is `n.` Enter `y` if the trunk group terminates on a Digital Toll Office.

STT Loss This field is only displayed condition that the *Connected to Toll* field is translated `n.` Allowable entries are the default *normal* or option *low*. Refer to chapter 4, *The Digital Loss Plan,* for a description of the digital loss plan and for application information.

DTT to DCO LOSS Allowable entries are the default *normal* or option *low*. Refer to chapter 4, *The Digital Loss Plan,* for a description of the digital loss plan and for application information.

Figures 7-73, *Trunk Group Screen, Page 2 (Tie),* an 7-74, *Trunk Group Screen, Page 3 (Tie),* depict this procedure.

```
                                      TRUNK GROUP              Page 2 of 9

                ACA Assignment? n                    Long Holding Time (hours): 1
     Short Holding Time (secs.): 10                   Short Holding Threshold: 15
                   MIS Measured? n
Internal Alert? n
                  Used for DCS? n    PBX ID: 1           Data Restriction? n
              Maintenance Tests? y
          Suppress # Outpulsing? n
```

Figure 7-73. Trunk Group Screen, Page 2 (Tie)

```
                          GROUP MEMBER ASSIGNMENTS              Page 3 of 9

          Port       Name          Night    Mode        Type       Ans Delay

      1:  ________   __________    _____    ________    _______    _____
      2:  ________   __________    _____    ________    _______    _____
      3:  ________   __________    _____    ________    _______    _____
      4:  ________   __________    _____    ________    _______    _____
      5:  ________   __________    _____    ________    _______    _____
      6:  ________   __________    _____    ________    _______    _____
      7:  ________   __________    _____    ________    _______    _____
      8:  ________   __________    _____    ________    _______    _____
      9:  ________   __________    _____    ________    _______    _____
     10:  ________   __________    _____    ________    _______    _____
     11:  ________   __________    _____    ________    _______    _____
     12:  ________   __________    _____    ________    _______    _____
     13:  ________   __________    _____    ________    _______    _____
     14:  ________   __________    _____    ________    _______    _____
     15:  ________   __________    _____    ________    _______    _____
```

Figure 7-74. Trunk Group Screen, Page 3 (Tie)

Port This field associates each trunk group member to a particular network (1 or 2), carrier (A-E), slot (01-20), and circuit (01-24). To keep things simple, try to match trunk group member and DS1 channel assignments (for example, trunk group member 1 on channel 1

Name Typically, this entry is a 7-digit telephone number. However, another candidate would be the 10-digit trunk circuit identification number, which is available from the circuit provider.

Night This is a new capability with Generic 1 and System 75, R1V3. It permits an individual trunk member to override the `night service` option that is administered on page 1 of the TRUNK GROUP screen. Allowable entries are an extension, the attendant, or to leave blank if the *Trunk Type* field does not begin with **auto/...**

Mode For DS1 tie trunk applications, the default and only permitted entry is `e&m.`

Type For DS1/DMI applications, the default is `T1 stan` (T1 standard). Normally, this field is not administered. The default value is appropriate.

Ans Delay Allowable entries (in milliseconds) range from 20 to 5100 in intervals of 20. This should only be translated if delay-dial were optioned.

Processor Interface Data Module — ISDN-PRI Applications

Each ISDN-PRI circuit pack maintains the 24th channel as the D-signaling channel. For the switch processor to communicate with the D-signaling channel an administration link must be established between the processor and the D-channel. The procedure for establishing this link involves administering the following three screens:

- PROCESSOR INTERFACE DATA MODULE
- PROCESSOR CHANNEL ASSIGNMENTS
- INTERFACE LINKS

Figure 7-75, *Data Module Screen*, depicts this procedure.

```
                                   DATA MODULE                  Page 1 of 1

        Data Extension: ______
Type: procr-infc
Physical Channel: ____
                  Name: ________________        Cos: 1

COR: 1
                          Maintenance Extension: _____

   ABBREVIATED DIALING

     List 1: ____________

   HOT LINE DESTINATION
          Abbreviated Dialing Dial Code (from above list) : _

   ASSIGNED MEMBERS (Stations with a data extension button for this data module)

          Ext     Name                           Ext     Name

       1:                                     3:
       2:                                     4:
```

Figure 7-75. Data Module Screen

Data Extension A unique extension number that identifies the data module. Actually, this is a phantom data module and frequently this extension number is identified as a phantom number. The extension number can be any reserved number within the Dial Plan Record. (See also the *Physical Channel* field description below.)

Type Enter `procr-infc` for ISDN-PRI applications.

Physical Channel A two digit number which corresponds to the physical channel of the processor interface circuit packs (TN765s). If there is one TN765, these numbers range form 01 to 04; if there are two TN765s, these numbers range form 01 to 08.

Name Completing this field is optional. If you choose to complete this field, enter a unique link application, such as ISDN-PRI(1) or ISDN-PRI(2).

The ISDN-PRI application does not place any additional restraints or special considerations on the remaining fields.

Processor Channel Assignments — ISDN-PRI Applications

This screen associates a processor channel to an interface link number. (Processor Interface Data Module), which was previously defined. Additionally, 1 of the 64 interface channels is identified and linked, via administration, to identified processor channel. Figure 7-76, *Processor Channel Assignment Screen,* depicts this procedure.

```
                    PROCESSOR CHANNEL ASSIGNMENT          Page 1 of 4

   Proc              Interface                  Remote
   Chan   Appl.      Link  Chan     Priority    Proc Chan      Machine-ID

     1:  ________    _     ___      ______      ___            __
     2:  ________    _     ___      ______      ___            __
     3:  ________    _     ___      ______      ___            __
     4:  ________    _     ___      ______      ___            __
     5:  ________    _     ___      ______      ___            __
     6:  ________    _     ___      ______      ___            __
     7:  ________    _     ___      ______      ___            __
     8:  ________    _     ___      ______      ___            __
     9:  ________    _     ___      ______      ___            __
    10:  ________    _     ___      ______      ___            __
    11:  ________    _     ___      ______      ___            __
    12:  ________    _     ___      ______      ___            __
    13:  ________    _     ___      ______      ___            __
    14:  ________    _     ___      ______      ___            __
    15:  ________    _     ___      ______      ___            __
    16:  ________    _     ___      ______      ___            __
```

Figure 7-76. Processor Channel Assignment Screen

Proc Chan This is a display only field. You can select any of the following processor channels (5-7, 9, 11-58, 60-64); conditional that the identified channel is not already used.

Appl This field should be administered `isdn` for ISDN-PRI applications.

Interface Link Permitted encodes are 1 through 8. The number selected should match the number previously administered on the PROCESSOR INTERFACE DATA MODULE screen.

Interface Chan Not used in Generic 1.

Priority Servicing the D-Channel is a high priority issue. Therefore, `h` (for high) should be administered for all ISDN-PRI applications.

For ISDN-PRI applications the other fields should remain blank.

Interface Links — ISDN-PRI Applications

This screen identifies the interface link and enables the link. Figure 7-77, *Interface Links Screen*, depicts this procedure.

```
                         INTERFACE LINKS                          Page 1 of 1

Link  Enable   Est     PI                  Destination       DTE/
               Conn    Ext      Prot       Digits    Brd     DCE     Identification

  1:    y      y       _____    ISDN       _____     _____   _ _ _   _______________
  2:    n      _       _____    _____      _____     _____   _ _ _   _______________
  3:    n      _       _____    _____      _____     _____   _ _ _   _______________
  4:    n      _       _____    _____      _____     _____   _ _ _   _______________
  5:    n      _       _____    _____      _____     _____   _ _ _   _______________
  6:    n      _       _____    _____      _____     _____   _ _ _   _______________
  7:    n      _       _____    _____      _____     _____   _ _ _   _______________
  8:    n      _       _____    _____      _____     _____   _ _ _   _______________
```

Figure 7-77. Interface Links Screen

Link This is a display only field. The interface link identified and enabled should be the same number as previously translated in the *Physical Channel* field of the DATA MODULE screen.

Enable Enter `y` to enable the link.

Est Conn Enter `y` for all ISDN-PRI applications.

PI Ext This is a display only field. It should display the phantom Data Extension that was previously administered with the DATA MODULE screen.

Prot Enter `ISDN` for all ISDN-PRI applications.

Destination Digits Field disappears when PROT=ISDN

Destination Brd Enter the ISDN-PRI 4-character circuit pack address. The first digit (1 or 2) identifies the port, the second character (A-E) identifies the carrier, the third and fourth digits (01-20 or 01-18) identify the circuit pack slot number.

DTE/DCE Field disappears when PROT=ISDN

Identification Optional, but typically should include the identifying name of the destination switch.

Trunking Considerations — ISDN-PRI Applications

It is necessary to determine those types of ISDN-PRI network services desired before attempting to build the ISDN-PRI trunk groups. Some of the more significant considerations should include the following:

NOTE: An ISDN-PRI trunk group is created by translating the *Group Type* field as `isdn-pri.`

1. Will the switch provide ISDN-PRI private network access or ISDN-PRI public network access?

2. If private network access, you can translate the *Service Type* field as *tie.* Depending on the particular application other service types may also be applicable (such as *tandem)*, in particular if you want traveling class marks (TCMs).

3. If public network access, then the identity of the interexchange carrier (IXC) or local exchange carrier (LEC) must be known. Furthermore, the particular carrier's ISDN network Services/Features (that are to be used) must be known and defined in software translations.

   NOTE: The NETWORK-FACILITIES screen lists (by name and facility coding definition) each of the currently available AT&T ISDN network Services/Features. These are frequently called the *Predefined Services/Features.* If public network access is to an LEC or to an IXC other than AT&T (or if it is not defined), then that carriers ISDN Services/Features should be defined in the lower half of the screen.

4. If public network access, then translate the *Service Type* field as required (such as *cbc).*

5. If the *Service Type* field is translated *cbc*, then (as an option):

   a. From 1-to-3 *USAGE ALLOCATION PLANS* may be defined.

   b. A time-of-day day-of-week *ASSIGNMENT SCHEDULE* (consisting of up to six transition times per day) may be defined for each usage allocation plan. Alternately, a usage allocation plan may be defined as *fixed* meaning that the selected allocation plan is always in effect.

6. For all Service Types, each incoming type of Service/Feature (such as MEGACOM 800 and SDN) may receive service-specific incoming call handling treatment. Included is the administration ability to request SID-ANI on a per call basis, to do digit deletion/digit insertion on a per call basis, or to effect night-service routing based on attributes of the incoming call.

   NOTE: The determination of whether the switch will request SID/ANI (on a CBC basis) depends on the station called and certain administration data for that station.

Advantages of CBC Trunking

In a non-CBC Service Selection environment, specific DS1 channels must be preassigned and provisioned for each desired service. To determine the proper number of trunks per service application requires extensive traffic engineering studies. With such a study, trunk groups can be designed to accommodate a customer's peak traffic for given service applications. Furthermore, the time when one service application encounters peak traffic may not coincide with when another service application encounters peak traffic. As an alternative, if multiple network services are accommodated with a single trunk group, and that trunk group is provided with allocation and scheduling controls, then significant trunking efficiencies are realized by distributing the traffic over the total number of available trunks.

CBC Usage Allocation Plans control the trunk groups so that dedicating a trunk group to an ISDN application is not needed. However, the administration ability to establish dedicated (or static) trunk groups still exists. By implementing usage allocation plans, the customer can optimize the CBC trunk group without involving any of the IXC/LEC network services personnel. The flexibility to control the CBC trunk is built into Generic 1; changes are transparent to the network provider.

Network Facilities — ISDN-PRI Applications

This screen is, from the user perspective, display only. However, the Customer Support Service Organization (CSSO) may administer (add) new services or features as required. In terms of comparison, this screen is somewhat equivalent to procedure 279, word 1. Figure 7-78, *Network-Facilities Screen,* depicts this procedure.

```
                              NETWORK-FACILITIES

Predefine   Services/Features

                      Facility                                  Facility
     Name           Type    Coding               Name         Type   Coding

  outwats-bnd         1      00001            megacom-800       1     00010
  operator            0      00101            megacom           1     00011
  sub-operator        0      00110            Inwats            1     00100
  sdn                 1      00001            wats-max-bnd      1     00101
  accunet             1      00110            lds               1     00111
  i800                1      01000            multiquest        1     10000


Additional  Services/Features

                      Facility                                  Facility
     Name           Type    Coding               Name         Type   Coding

  _______________     _     ______            _______________   _    ______
  _______________     _     ______            _______________   _    ______
  _______________     _     ______            _______________   _    ______
  _______________     _     ______            _______________   _    ______
```

Figure 7-78. Network-Facilities Screen

Name Up to 15 alphanumeric characters that uniquely identify (by name) the *Service* or *Feature.*

> **NOTE:** The name `ACCUNET` is used to access both domestic and international service.

Facility Type The ISDN-PRI specification requires that each network capability be identified as either a *feature* `(0)`, or *service* `(1)`.

Facility Coding The ISDN-PRI specification further requires that each service or feature be identified as a:

- Parameterized Service
- Parameterized Feature
- Binary Service
- Binary Feature *

Trunk Group — ISDN-PRI Trunk Applications

ISDN-PRI trunk groups are defined by using the first page of the TRUNK GROUP screen. Since ISDN-PRI uses Message Oriented Signaling, the format of this screen is somewhat different from the assigned basic DS1 service.

Page 2 administers certain features that are unique to ISDN-PRI trunk groups. Screen pages 3 and 4 are only displayed if the *Service Type* field on page 1 is administered CBC. Screen pages 5 through 11 are used as required to assign group members.

Figure 7-79, *Trunk Group Screen, Page 1 (ISDN-PRI),* depicts this procedure.

```
                              TRUNK GROUP                        Page 1 of 11

     Group Number: _                 Group Type:  isdn-pri  SMDR Reports? y

       Group Name: OUTSIDE CALL            COR: 1      TAC: ____
        Direction: two-way    Outgoing Display? n
      Dial Access: y            Busy Threshold: 99        Night Service: _____
     Queue Length: 0
     Service Type: cbc                 Auth Code? n
      Usage Allot? y           Far End Test No: _______________

     TRUNK PARAMETERS

     Send Display/TCM in codeset 6/7: 6
            Max Message Size to Send: 260
 Connected to Toll? n        STT Loss: normal              DTT to DCO Loss: normal
          Bit Rate: 1200       Synchronization: async     Duplex: full
```

Figure 7-79. Trunk Group Screen, Page 1 (ISDN-PRI)

Only the new ISDN-PRI service application fields or those fields that require special or additional considerations are mentioned here.

Group Type For ISDN-PRI service applications this field should be translated isdn-pri.

> **NOTE:** The SYSTEM-PARAMETERS CUSTOMER-OPTION screen must have `ISDN-PRI` service enabled before this trunk group type can be translated.

Dial Access Normally, this field is defined as `y.` However, for some public network connections (such as service type CBC, MEGACOM, etc.), this field is defined as `n.`

Night Service If administered, then the extension number translated will receive all incoming calls (for the particular trunk group) when the switch is placed in night service mode.

> **NOTE:** Page 2 of the TRUNK GROUP screen permits an override entry for each particular type of ISDN network service. Also, trunk member night service is allowed.

Service Type Assigns the service application for the ISDN-PRI trunk group. Since CBC permits reduced costs (depending on tariff and application), an improved grade-of-service, and customer premis control of networking, the option *cbc* should be considered for public network applications. Other options include any of the predefined or additional Services/Features listed in the *Name* field of the NETWORK-FACILITIES screen. Also, the options *access, tie,* and *tandem* are permitted.

Usage Allot Field encodes and their descriptions are:

- y Enable usage allocation for those services provided by the trunk group. Used to maximize customer control of the allocation of CBC trunk group members to services (such as preventing a service from monopolizing the member of a group).

  > **NOTE:** This option permits up to three usage allocation plans to be defined for the identified trunk group. The term usage allocation is the ability to set both a minimum and maximum number of trunk members that an ISDN Service/Feature may use at a given time. Each usage allocation plan can set limits for up to 10 services/features.

- n Disable usage allocation for the trunk group (default). This option places restrictions on either the Services/Features that can be carried on the trunk group or the number of calls that any one Service/Feature can have at any given time.

Far End Test No This is the ISDN-PRI test line associated with the far-end's test equipment and is reserved exclusively for maintenance testing. The test number should be assigned for both private and public networks. There is one test number per trunk group. As a part of the installation and ISDN-PRI service provisioning process, the test number must be coordinated with the terminating switch.

> **NOTE:** This field is equivalent to translating procedure 108, word 1, for Generic 2.

Send Display/TCM in Codeset 6/7 This field maps the display information (codepoint 8) and the TCM information (codepoint 40) to codeset 6 or codeset 7, depending on whether a 6 or a 7 is translated. The distant switch will determine which should be translated. Specifically, if the distant switch is a 4ESS with 4e11 or 4e12 software, or a System 85 R2V4, then this field should be translated with a 7. If the distant switch is a 4ESS with 4e13, Generic 1, or Generic 2, then the field should be translated with a six.

> **NOTE:** For tandem node configurations, Generic 1 rebuilds the message in conformance to the outgoing trunk group. If any codeset/codepoint conversions are required, then the two endpoints must coordinate the conversions. Generic 1 can receive in either codeset (this is a send option).

Max Message Size to Send This field determines the maximum number of bytes that may be transmitted before an acknowledge reply is required. Permitted entries are 128, 244, 256, and 260 (default). This field must be administered to be the maximum size messages that the far end is able to receive and process. If the distant switch is another Generic 1, then any entry will work. Currently, System 85 R2V4, Generic 2, all releases of 4ESS, and 5ESS only support 128.

The fields on page 2 of the TRUNK GROUP screen comprise an incoming call handling table. The table consists of up to 12 rows of seven columns per row. The first three columns constitute a key that together select which row or unique treatment should apply for an incoming call on the group. The remaining four columns specify the treatment to be provided for a call that matches the key.

The first column or field in the key is the *Service/Feature* field. If an incoming call is for a service listed in a row in the incoming call handling table, then that row may specify the treatment for the call, depending on the other two columns of the key. The *Called Len field is used to continue the row determination. If the number of digits received with the incoming call match the number of digits in the Called Len* field for calls to the matched service, then this row may apply. If no other row also contains a matching service and called length, then this row does apply. If another row does exist with the same service and number length, then the *Called Number* field will be used to continue the row determination. If the leading digits received with the incoming call match the digits specified in the *Called Number* field, then this row applies to the call. Therefore, with this table, a unique treatment can be given to any incoming call, even if these calls are to the same service or have the same length of digits. The remaining four fields specify the unique treatment for the call once the row has been determined. Together, the *Del* and *Insert* fields can be used to manipulate the incoming number that will be used to route the call. The *Per Call SID/ANI* field can be used to request SID/ANI only for specific calls incoming on the group. The *Night Serv* field is used to have calls of different types routed to different night destinations when night service is in effect.

The biggest application of this table is when a Generic 1 is connected to the public network with several different services, such as MEGACOM® 800 service and ACCUNET® Switched Digital Services, but it also has applications when used in a private network.

NOTE: Administering this table is optional.

Figure 7-80, *Trunk Features Screen, Page 2 (ISDN-PRI)*, depicts this procedure.

```
                              TRUNK FEATURES              Page 2 of 11

            ACA Assignment? n          Long Holding Time (hours): 1
Short Holding Time (secs.): 10            Short Holding Threshold: 15
              MIS Measured? n                      Internal Alert? n
              Used For DCS? n       PBX ID: 1    Data Restriction? n
         Maintenance Tests? y                            Send SID? n
                                                        Send Name? n

  Service/    Called    Called       Del      Insert       Per Call   Night
  Feature      Len      Number                             SID/ANI    Serv
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
 __________   ___    ____________   ___   ___________    _________   ______
```

Figure 7-80. Trunk Group Screen, Page 2 (ISDN-PRI)

Only the new ISDN-PRI service application fields or those fields that require special or additional considerations are mentioned here.

Send SID

This field determines whether the Station Identification (SID) number is sent to the network for both incoming and/or outgoing ISDN calls. For outgoing calls, the user's calling party number is sent. For incoming calls, the number associated with the answering party is sent. Field encodes and their descriptions are:

- y Send the SID.

  NOTE: If SID is enabled, then the SID PREFIX TABLE screen must be completed.

- n Do not send the SID (default).

  NOTE: Both SID and ANI significantly enhance the AT&T ISDN network capabilities. The customer can subscribe to the SID/ANI service and have a representation of the calling party number forwarded from the AT&T network to the terminating switch. Therefore, consider provisioning and enabling the SID/ANI option as part of the installation/administration process.

Send Name This field determines whether the calling (originating) party's administered name is sent to the network for outgoing calls and whether the connected (answering) party's name is sent to the network for incoming calls. Field encodes and their descriptions are:

- y Enable this capability. You can enable this field; however, there may be cases where it is desirable to disable this option (for example, security, privacy, and personal preference).
- n Disable this capability (default).

NOTE: Administering the *Send Name* field is equivalent to administrating procedure 012, words 1 and 2, with the exception that Generic 1 cannot be administered to transmit the trunk group name.

Typically, those trunk groups that are administered for cbc service type will receive a variety of incoming call types. These incoming calls may originate from a variety of sources (for example, public network, private network, or host computer).

The incoming call handling software processes incoming calls based on:

- The number of digits received
- The type of digits
- Whether the call has an identifying NSF (for example, MEGACOM 800, SDN, or ACCUNET)

Service/Feature Permitted entries include any of the predefine or additional Services/Feature listed on the NETWORK FACILITIES screen and supported by this trunk group. Also, the special identifier, other, may be translated (as a catch-all entry) for all Services/Features not explicitly specified.

The *Service/Feature* field is the first item searched. Following a match in the *Service/Feature* field, then the associated entry for the *Called Len* field is searched, and if a match is found then the *Called Number* field is searched. Failure to match the associated *Called Len* or *Called Number* will cause the search to continue to the next *Service/Feature* entry. (For a list of predefined Service/Features that can be received, see the *Service Type* field description.)

Called Len Specifies the expected number of digits to be contained in the called-party number IE. Field encodes and their descriptions are:

- A number within the range (0 to 16) — the number of digits received must match the number that is administered in this field.

  If the IXC is AT&T and if the ISDN network service is MEGACOM 800, SDN, or a switched digital service, then a 4ESS may deliver from 0 to 7 digits. Therefore, if the service is correctly provisioned, then the proper number (and required number) of digits will be delivered to the switch.

- No entry, leave the field blank. This will suffice for the case where the number of digits received is not significant.

Called Number

Generally, this field only specifies some of the leading digits that are contained in the called-party number IE. The digits received must match, on a digit-per-digit basis, what is administered in this field. Field encodes and their descriptions are:

- A series of numbers, which may consist of from 1 to 16 digits, corresponding to the required leading digits.

  NOTE: If this field is administered then the associated *Called Len* field must also be administered.

- No entry, leave the field blank. This will suffice for the case where the digits received are not significant.

Del

The digit *Del* and digit *Insert* fields (together) provide the ability to do digit manipulation/digit replacement on incoming calls. It is the manipulated number that is used to route the call.

The *Del* field specifies the number of leading digits to be deleted from the Called Party Number IE. Once the specified number of digits have been deleted, the digits specified in the *Insert* field are prepended to the front of the Called Party Number. Field encodes and their descriptions are:

- A series of numbers, which may consists of from 1 to 16 digits, corresponding to the leading digits that are to be deleted. This administration option may be used to solve many of the problems relating to cross dial plan mapping.

  Application Example #1

  If the called-party number IE contains a 4 digit number (that uniquely identifies an extension or hunt group) but does not align with the required address because the switch has a 5 digit dial plan. Then, the appropriate leading digit may be inserted so that the call will route correctly.

  Application Example #2

  If the called-party number IE contains the digits [8123] or [8567] but it is desired to route these calls to hunt groups with extensions [44123] and [44567] respectively. Then, the screen would have an entry for each number, and the *Del* fields would contain a one and the *Insert* fields would contain the digits 44.

  NOTE: The number of digits deleted cannot be greater than the number specified in the *Called Len* field.

- No entry, leave the field blank. When no digits are to be deleted.
- The word all. This option may be used to route particular types of calls to a specific extension number. This specific extension number would be administered in the *Insert* field.

Insert The digits inserted before the Called Party Number IE. This specifies the digits prepended to the front of the remaining digits after any (optional) digit deletion has been performed. The resultant number formed from digit deletion/insertion is used to route the call, providing that night service is not in effect. Field encodes and their descriptions are:

- A series of numbers, which may consists of from 1 to 16 digits.
- No entry, leave the field blank. This will suffice for the case where no digits are to be inserted.

Per Call SID/ANI Specifies if and how to request SID or ANI for this particular type of Service/Feature. Field encodes and their descriptions are:

- No entry, leave the field blank (default). Specifies that the switch will not request either SID or ANI for any of these types of calls after call delivery. Use `no entry` when the network is provisioned to always send SID/ANI with call setup.
- ANI-only
- ANI-pref — but will accept SID
- SID-only
- SID-pref — but will accept ANI
- None — same as blank

Night Serv Permits the administration of a particular night service extension for each row in the table. This entry will override the night service administered for the whole trunk group (on page 1 of the TRUNK GROUP screen). Field encodes and their descriptions are:

- An extension number
- The attendant
- No entry, leave the field blank (default). This will not override night service for the whole trunk group.

The TRUNK FEATURES screen (Page 2 of 11) may have more than one entry for the same Service/Feature. Frequently, multiple entries (per Service/Feature) are used to provide multiple call routes for that Service/Feature. The route selected will be dependent on the received digits and specific administration details of the digit manipulation fields. If an incoming call matches more than one entry, then the most restrictive entry is selected. (This is why it is not CBC specific.)

The following case examples show this point and should clarify how the incoming call handling software functions in this scenario.

Case 1

- *Service/Feature* field is specified (for example, `mega800`).
- *Called Len* field is specified with a requirement of N digits (for example, `N = 5`).
- *Called Number* field is specified with M leading digits, where M is a number of digits less than N (for example, the three digits 855).

NOTE: The screen that follows these case examples depicts a line entry (Service/Feature, Called Len, Called Number,...) for each case. The first (top) entry is for case 1, the second entry from the top is for case 2,...the last entry shown is for case 7.

Case 2

- *Service/Feature* field is specified (for example, `mega800`).
- *Called Len* field is specified with a requirement of N digits (for example, `N = 5`).
- *Called Number* field is specified with M leading digits, where M is a number of digits less than N (for example, the single digit 8).

Application for Case 1 being selected — most restrictive

Assume the switch receives a MEGACOM 800 call that has a called-party number IE with 85542. Based on the Service/Feature and *Called Len* fields alone, this call will match both case 1 and case 2. However, on analyzing the called-party number, the incoming call handling software will select Case 1 since it is the more restrictive match. Each incoming call is searched against every screen entry to identify the appropriate match.

Application for Case 2 being selected

Assume the switch receives a MEGACOM 800 call that has a called-party number IE with the digits 84000. Based on the *Service/Feature* and *Called Len* fields alone, this call will match both Case 1 and case 2. However, on analyzing the called-party number, it is determined that the leading digits (84000) do not match the digits for Case 1 but do match for Case 2.

Case 3

- *Service/Feature* field is specified (for example, `mega800`).
- *Called Len* field is specified (for example, 4).
- *Called Number* field is not specified (that is, left blank).

Application for Case 3 being selected

A MEGACOM 800 call is received that has a called-party number IE with the digits 8654. Based on the *Service/Feature* field alone, this call matches Cases 1-3. However, on analyzing the Called Party Number IE, there are only 4 leading digits (8654). Cases 1 and 2 are eliminated since they require a Called Len of 5 digits (Case 3 requires 4 digits). Furthermore, the Case 3 *Called Number* field is blank, which matches any number regardless of digit format. The incoming call handling software selects Case 3 since it matches and is more restrictive than Cases 4-7.

Case 4

- *Service/Feature* field is specified (for example, `mega800`).
- *Called Len* field is not specified (that is, left blank).
- *Called Number* field is not specified (that is, left blank).

Application for Case 4 being selected

Assume the switch receives a MEGACOM 800 call that has a called-party number IE with the digits 75442. Based on the *Service/Feature* field alone, this call will match Case 1, 2, 3, and 4. However, on analyzing the Called Party Number IE, it is determined that there are the following 5 leading digits (75442). Case 3 does not match because it requires 4 digits. Case 1 and 2 both require 5 digits, but specify an 8 as the leading digit and therefore do not match. For Case 4, the *Called Len* and *Called Number* fields are blank, which matches any number regardless of the number of digits or digit format.

Case 5

- *Service/Feature* field is specified as other.
- *Called Len* field is specified with a requirement of N digits (for example, N = 5).
- *Called Number* field is specified with M leading digits, where M is a number of digits less than N (for example, the three digits 855).

Case 6

- Service/Feature field is specified as other.
- *Called Len* field is specified with a requirement of N digits (for example, N = 5).
- *Called Number* field is specified with M leading digits, where M is a number of digits less than N (for example, the single digit 8).

Case 7

- *Service/Feature* field is specified (for example, `other`)
- *Called Len* field is specified (for example, N)
- *Called Number* field is not specified (that is, left blank)

Case 8

- *Service/Feature* field is specified (for example, `other`)
- *Called Len* field is not specified (that is, left blank).

- *Called Number* field is not specified (that is, left blank).

  NOTE: Case 8 is the least restrictive (nonrestrictive) and will match all calls not handled by any other case.

Applications for Cases 5-8

Cases 5-8 are similar to Cases 1 through 4 respectively. The only difference is that the *Service/Feature* field is changed to other. The remaining fields repeat the same conditions on a case-by-case basis. Therefore, cases 5-8 may serve to receive other incoming Services/Features (for example, SDN or any of the Switched Digital Services).

Example Screen Entries for Cases 1-8

Figure 7-81, *Trunk Group Screen, Page 2 (ISDN-PRI) for Cases 1-8*, depicts this example.

```
                              TRUNK FEATURES                Page 2 of 11

            ACA Assignment? n            Long Holding Time (hours): 1
 Short Holding Time (secs.): 10             Short Holding Threshold: 15
              MIS Measured? n                       Internal Alert? n
              Used For DCS? n        PBX ID: 1    Data Restriction? n
         Maintenance Tests? y                             Send SID? n
                                                         Send Name? n

   Service/     Called     Called        Del      Insert      Per Call    Night
   Feature       Len       Number                             SID/ANI     Serv
  mega800        5        855            ___   ____________  __________  _______
  mega800        5        8              ___   ____________  __________  _______
  mega800        4      ______________   ___   ____________  __________  _______
  mega800       ___     ______________   ___   ____________  __________  _______
  other          N        M              ___   ____________  __________  _______
  other          N        M              ___   ____________  __________  _______
  other          N        blank          ___   ____________  __________  _______
  other          bla      blank          ___   ____________  __________  _______
  ____________  ___     ______________   ___   ____________  __________  _______
  ____________  ___     ______________   ___   ____________  __________  _______
  ____________  ___     ______________   ___   ____________  __________  _______
  ____________  ___     ______________   ___   ____________  __________  _______
```

Figure 7-81. Trunk Group Screen, Page 2 (ISDN-PRI) for Cases 1-8

Trunk Group Usage Allocation — ISDN-PW Applications

If the trunk group *Service Type* field is administered `cbc,` then up to 10 Service/Feature specific digit treatments can be administered for each usage allocation plan, refer to the CBC TRUNK GROUP USAGE ALLOCATION screen (Page 3 of 11).

NOTE: Although each usage allocation plan may contain up to 10 entries, a given Service/Feature may only be listed once per plan:

Many other scenarios may be developed for applying a plan. Various reasons may be used. Figure 7-82, *Trunk Group Screen, Page 3 (ISDN-PRI)*, depicts this procedure.

```
                        CBC TRUNK GROUP USAGE ALLOCATION          Page 3 of 11

Usage Allocation Plan 1    Usage Allocation Plan 2    Usage  Allocation Plan 3

Service/Feature Min# Max#  Service/Feature Min# Max# Service/Feature Min# Max#
                Chan Chan                  Chan Chan                 Chan Chan

_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
_______________  __   __   _______________  __   __  _______________  __   __
```

Figure 7-82. Trunk Group Screen, Page 3 (ISDN-PRI)

Usage Allocation Plan Before administering the Usage Allocation Plans it is first necessary to define a strategy for each plan. For example; plan 1 could specify those actions to be taken during a normal business day, plan 2 could specify those actions to be taken during non working hours of the business day (during lunch and when phones are not attended), while plan 3 could specify those actions to be taken during the weekend. An alternate example could just use plans 1 and 2 on a scheduled basis, but have plan 3 defined and available for fixed allocation. Obviously, many other strategies could be defined.

Service/Feature Permitted entries include any of the predefined or additional *Service/Features* listed on the NETWORK FACILITIES screen that this trunk group supports. Also, the special identifier other may be translated (as a catch-all entry) for all Services/Features not explicitly specified.

Min# Chan This field reserves a specified number of trunk group members that are to always be available to the associated Service/Feature. Permitted numbers are any number within the range of 0 to 99.

> **NOTE:** For each allocation plan, the sum of the Min# Chan columns must be less than the total number of members for the trunk group. To maximize the utility of CBC Service Selection, the sum of the Min# Chan column must be much less than the total number of members for the trunk group. The difference between this sum and the total numbers of members determines the overflow pool.

Max# Chan This field established the maximum number of trunk members that can be used by the associated Service/Feature application at any one time (for example, MEGACOM 800).

An Example Application for Usage Allocation Plans

A given ISDN-PRI trunk group has the *Service Type* field translated cbc and has 23 trunk members. And if:

1. At any given time, no more than 15 members (that is, Max# Chan = 15) will be used for the particular Service/Feature.
2. At least 5 members (that is, Min# Chan = 5) will always be reserved for this service application.

Then, these Min Chan and Max Chan administration assignments insure the following:

1. At least 8 trunk members will be available for other types of calls. Other types of calls may be a combination of both incoming and outgoing.
2. Regardless of the maximum bound assigned to other services, there will always be at least 5 members that can carry calls for the associated Service/Feature (for example, MEGACOM 800).

   NOTE: This type of allocation plan has the characteristic of insuring that no single service will dominate the trunk group, while still allowing for periodic fluctuations in demand. If a particular Service/Feature attempts a call that would result in exceeding the specified threshold, then that call is rejected.

Usage Allocation Plan Assignment Schedule — ISDN-PRI Applications

The CBC USAGE ALLOCATION PLAN ASSIGNMENT SCHEDULE screen permits the customer to administer a usage allocation plan and to vary the plan by both time of day and day of week. Figure 7-83, *Trunk Group Screen, Page 4 (ISDN-PRI),* depicts this procedure.

```
     CBC TRUNK GROUP USAGE ALLOCATION PLAN ASSIGNMENT SCHEDULE     Page 4 of 11

 Usage Method:
        Fixed? y       Allocation Plan Number: 1
    Scheduled? n

Usage Allocation Plan Activation Schedule:

       Act   Plan  Act   Plan  Act   Plan  Act   Plan  Act   Plan  Act   Plan
       Time   #    Time   #    Time   #    Time   #    Time   #    Time   #

Sun    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _
Mon    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _
Tue    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _
Wed    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _
Thu    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _
Fri    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _
Sat    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _    __:__ _
```

Figure 7-83. Trunk Group Screen, Page 4 (ISDN-PRI)

Fixed

This method allows the customer to specify a single usage allocation plan to be used for all time. Field encodes and their descriptions are:

- y Enable this method. The plan that is administered in the *Allocation Plan Number* field will be enabled.
- n Disable this method. Consequently, the scheduled method must be enabled for this CBC application.

Allocation Plan Number

Specifies the plan number (1, 2, or 3) that is to be enabled when fixed usage is selected.

Scheduled

This method allows the customer to specify that scheduled usage allocation is desired. Field encodes and their descriptions are:

- y Enable this method.

  NOTE: The time of day (account time or plan number) day of week entries must have been administered before this field is enabled. The customer can override or suspend the specified usage allocation schedule by changing or enabling the fixed method.

- n Disable this option.

Act Time Specifies the time that the associated usage allocation plan will become effective. Time must be specified in 24-hr format. Permitted entries are 00:00 through 23:59.

> **NOTE:** Each day of the week must have at least one entry, but may have as many as six transition times. A transition time is defined as the time when another plan becomes effective. A new or different plan will not effect existing calls, but will effect new call attempts.

Plan # Specifies the plan number effective from the activation time to the activation time of the next *Act Time.* Field encodes and their descriptions are:

1 Plan number 1

2 Plan number 2

3 Plan number 3

Trunk Group Member Assignments — ISDN-PRI Trunk Applications

Adding members to an ISDN-PRI trunk group is similar to adding members to a DS1 trunk group. The prime difference is that with ISDN-PRI the TRUNK GROUP screen does not have the right three fields *(Mode, Type,* and *Ans Delay).* Figure 7-84, *Trunk Group Screen, Page 5 (ISDN-PRI),* depicts this procedure.

```
                 GROUP MEMBER ASSIGNMENTS                    Page 5 of 11

          Port         Name                Night       Sig Grp

      1.  1B1501___    ____________        __________    1
      2.  1B1523___    ____________        __________    1
      3.  1B1601___    ____________        __________    1
      4.  1B1623___    ____________        __________    1
      5.  1B1701___    ____________        __________    1
      6.  1B1709___    ____________        __________    _
      7.  1B1716___    ____________        __________    _
      8.  1B1724___    ____________        __________    _
      9.  1B1801___    ____________        __________    2
     10.  1B1823___    ____________        __________    2
     11.  1B1901___    ____________        __________    3
     12.  1B1923___    ____________        __________    3
     13.  _________    ____________        __________    _
     14.  _________    ____________        __________    _
     15.  _________    ____________        __________    _
     16.  _________    ____________        __________    _
```

Figure 7-84. Trunk Group Screen, Page 5 (ISDN-PRI)

Port This field associates each trunk group member to a particular network (1 or 2), carrier (A-E), slot (01-20), and circuit (01-24). To keep things simple, try to match trunk group member assignments with B-channel assignments (for example, trunk group member 1 on channel 1).

Name Typically, this entry is a 7-digit telephone number. However, another candidate would be the 10-digit trunk circuit identification number (available from the circuit provider).

Night This is a new capability with Generic 1. It permits an individual trunk member to override the night service option that is administered on page 1 of the TRUNK GROUP screen. Allowable entries are an extension, the attendant, or to leave blank.

Sig Grp This field associates a signaling group to a trunk group member. If a DS1 is assigned to only one signaling group, then this number appears in the `Sig Grp` column. This value cannot be changed (that is, a trunk cannot be moved from one signaling group to another) from this screen. To change a signaling group assignment, use the SIGNALING GROUP screen.

If a DS1 is assigned to more than one signaling group, no number appears in the `Sig Grp` column. You must manually assign one of these preassigned signaling groups (from 1-8) to this field.

SID Prefix Table — ISDN-PRI Applications

If the *Trunk Group* field *Send SID* is enabled (page 2 of the TRUNK FEATURES screen), then the screen **SID PREFIX TABLE** must be administered. Figure 7-85, *SID Prefix Table Screen,* depicts this procedure.

```
                              SID PREFIX TABLE                    Page 1 of 5

  Ext  Ext   SID               Ext  Ext   SID            Ext  Ext   SID
  Len  Code  Prefix            Len  Code  Prefix         Len  Code  Prefix
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
  __   _________________       __   ____  _________      __   ____  _________
```

Figure 7-85. SID Prefix Table Screen

Permitted entries are single digit numbers less than or equal to the number administered in the *Page Length* field of the DIAL PLAN RECORD screen. For example, if the *Page Length* field is translated five (meaning a five digit numbering plan), then this field may contain the number 1, 2, 3, 4, or 5. If the *Page Length* field is translated four (meaning a four digit numbering plan), then this field may contain the number 1, 2, 3, or 4.

NOTE: For most applications it is expected that this field will be translated with the same number as the *Page Length* field.

Ext Code Specifies a single explicit extension number, or a range of extension numbers. Permitted entries are any valid extension number, or range of extension numbers that are defined on the DIAL PLAN RECORD screen.

For example, assume that the Ext Len is five and that the Ext Code is administered with the digits 65. Then, the range of extension numbers is 65000 through 65999.

SID Prefix The number that is prefixed to the extension number to form a 10-digit Station Identification. The SID prefix can be a 5, 6, 7, 8, 9, or 10-digit number, or blank. A typical 6-digit SID prefix would be the switch 3-digit NPA and the 3-digit NNX (that is, NPANNX). If the number of digits in the SID prefix plus the extension length exceed ten, then excess leading digits from the extension number are deleted when forming the 10-digit SID number. If the SID prefix is a 10-digit number, then the extension number is not used.

An Example Application that uses SID

Assume that the switch has a 5-digit dial plan. For illustration purposes, assume that a company has its billing department (extensions 31000 through 31999) and sales department (extensions 41000 through 41999) located on the same switch. Furthermore, assume that the billing department does not want their individual extension numbers displayed on the far-end but rather wants the company's LDN (for example, 201-235-3000) displayed. On the other hand, the sales department does want their individual calling party's number displayed rather than the company's LDN. Figure 7-86, *SID Prefix Table Screen, Sample Application,* depicts the appropriate translations to achieve these objectives.

NOTE: If the *SID Prefix* field is blank, then neither the calling party name or calling party extension number is displayed.

```
                              SID PREFIX TABLE                    Page 1 of 5

 Ext  Ext   SID            Ext  Ext   SID            Ext  Ext   SID
 Len  Code  Prefix         Len  Code  Prefix         Len  Code  Prefix
 5    31    2012353000     __   ____  __________     __   ____  __________
 5    41    20123          __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
 __   ____  __________     __   ____  __________     __   ____  __________
```

Figure 7-86. SID Prefix Table Screen, Sample Application

Routing Patterns — ISDN-PRI Applications

> **NOTE:** The ROUTING PATTERN screen only relates to outgoing calls; page 2 of the TRUNK GROUP screen only relates to incoming calls.

A routing pattern is a set of trunk groups that carry calls to a particular switch. Each routing pattern is identified by a unique number known as the pattern number. A maximum of 254 different patterns may be administered. Each pattern may contain up to six different trunk groups (six alternate trunk routes). Once a routing pattern is accessed the call processing software will, depending on trunk group compatibility (both FRL and BCC) and trunk member availability, select the trunk groups in decreasing order of preference (that is, 1, 2,...6).

> **NOTE:** Both ISDN-PRI private networks and ISDN-PRI public networks require that one or more ROUTE-PATTERN screens be administered. For private networks, the RNX tables must be translated. Each RNX table serves as a pointer to one or more pattern numbers. For public networks, the appropriate *HNPA*, *FNPA*, and/or *RHNPA* tables must be translated. These tables serve as a pointer to one or more different pattern numbers.

Figure 7-87, *Routing Patterns Screen,* depicts this procedure.

```
                         ROUTING PATTERNS              Page 1 of 1

                        Pattern Number: _

Pattern Assignments (Enter Up To 6)

    Grp.   FRL  NPA   Prefix   Toll   No. Del   Inserted               IXC
    No.                 Mark   List   Digits    Digits
1.  ___     _   ___     __      __      __      ___________________    ___
2.  ___     _   ___     __      __      __      ___________________    ___
3.  ___     _   ___     __      __      __      ___________________    ___
4.  ___     _   ___     __      __      __      ___________________    ___
5.  ___     _   ___     __      __      __      ___________________    ___
6.  ___     _   ___     __      __      __      ___________________    ___

    BCC Value         Service/Feature
   0  1  2  3  4
1. _  _  _  _  _   ________________   Band: ___
2. _  _  _  _  _   ________________   Band: ___
3. _  _  _  _  _   ________________   Band: ___
4. _  _  _  _  _   ________________   Band: ___
5. _  _  _  _  _   ________________   Band: ___
6. _  _  _  _  _   ________________   Band: ___
```

Figure 7-87. Routing Patterns Screen

Pattern Number Permitted entries are numbers within the range 1 through 254. The appropriate number must come from the *RNX/HNPA/FNPA/RHNPA* tables.

Grp No. Permitted entries are numbers within the range 1 through 99. The appropriate number must come from the previously administered TRUNK GROUP screen.

> **NOTE:** There is no restriction on using the same trunk group number in more than one routing pattern.

FRL Permitted entries are numbers within the range 0 through 7 (where 0 is least restrictive and 7 is most restrictive).

> **NOTE:** ISDN-PRI does not alter the usage of FRLs. However, to access an ISDN-PRI trunk group, the calling extension must be compatible, both in terms of FRL and BCC.

NPA Permitted entries are the NPA (area code) for the terminating switch.

> **NOTE:** This field is not used for AAR or tie trunk applications, although it may still be translated.

Prefix Mark

This field is only used for public network (ARS) applications.

The Prefix Mark relates to the *ARS Prefix 1 Required?* field on the DIAL PLAN RECORD screen. If the *ARS Prefix 1 Required?* field is translated y, then (for certain type of calls) it may be necessary to transmit the one along with the dialed digits. The *Prefix Mark* field permits four different entries (numbers) for administering this capability. Field encodes and their descriptions are:

0 Specifies that the prefix digit one is not inserted.

> **NOTE:** This entry is appropriate when there are no Interchangeable CO Codes within the NPA. If the destination number is seven digits or less (for example, NNX-XXXX or a service code N11) then the digits are sent as dialed. Furthermore, for these type calls, if the prefix digit one is dialed it is not deleted. For 10-digit (NPA-NNX-XXXX) calls, if the prefix one is dialed it is deleted.

1 Specifies that the prefix digit one is sent if and only if the call is a 10-digit calls. For this entry, there may be Interchangeable CO Codes within the NPA.

2 Specifies that the prefix digit one is sent for all 7- and 10-digit toll calls. The associated toll list assigns which office codes are toll calls. For this entry, there may not be Interchangeable CO Codes within the NPA. With this entry, if the customer were to dial a one before a nontoll 7-digit call, the call would route as a toll call.

3 Specifies that the prefix digit one is sent for all toll calls, regardless of the number of digits. For this entry, there may be Interchangeable CO Codes within the NPA.

Toll List

This field is only used for public network (ARS) applications.

This field relates a specific ARS toll table to Prefix Marks two and three. Permitted entries are numbers 1 through 32.

No. Del Digits

Determines the number of digits deleted from the beginning of the digit string that is being prepared for sending. Permitted entries are numbers within the range of 0 through 11.

> **NOTE:** The insertion or deletion of the NPA is done with the Prefix Mark and the NPA is not included in the number of digits deleted or inserted.

Inserted Digits

Specifies the digits to be inserted at the beginning of the digit string that is being prepared for sending.

IXC

For ISDN-PRI private networks, enter a blank. For ISDN-PRI public networks the interexchange carrier's three digit identification should be translated. If this field is left blank for public network connections, then the presubscribed common carrier is assumed.

BCC Values Each routing pattern preference (1 through 6) has an associated *BCC Value* field. Therefore, when a preference is translated, the associated BCC must also be translated. A trunk group preference must be valid for one or more BCC values. Permitted entries are y to enable the value and n to disable the value.

A route can only be selected when there is compatibility (a match) with the BCC of the call originating extension or facility and a BCC value specified in the routing pattern.

Service/Feature This field is not used by the AAR software, but is required by the ARS software if the trunk group specified is CBC. Permitted entries include any of the predefined or additional Services/Features listed in the *name* field of the NETWORK-FACILITIES screen.

> **NOTE:** If the IXC is AT&T and the public network connection is to a 4ESS digital switch that is configured with either 4e11 or 4e12 generic software, then the *Service/Feature* field must be completed for all entries except ACCUNET switched digital service. For ACCUNET, this field should be left blank; however, the *BCC* field must be administered `n y n n n`. If a 4ESS is configured with 4e13 generic software, then the *Service/Feature* field must be completed for every entry — including ACCUNET.

Band Permitted entries are numbers 0 through 255 (which corresponds to outgoing-WATS bands 0 through 255).

> **NOTE:** This field is only displayed when the *Service/Feature* field is translated outwats-bnd.

Hunt Group — ISDN-PRI Applications

This main reason for using this screen (within an ISDN-PRI environment) is to support any of the call management/call distribution systems. Figure 7-88, *Hunt Group Screen,* depicts this procedure.

```
                         HUNT GROUP                        Page 1 of 6

      Group Number: _             Group Extension: ____     Group Type: ucd
        Group Name: _______________  Coverage Path: ___            COR: 1
     Security Code: _____          Message Center: none       ACD? n
            Queue? n     Night Service Destination: ____
  ISDN Caller Disp: ________
```

Figure 7-88. Hunt Group Screen

Only the new ISDN-PRI service application fields or those fields that require special or additional considerations are mentioned here.

ISDN Caller Disp Specifies whether the hunt group name or the member name will be sent to the originating extension. Field encodes and their descriptions are:

- `grp-name` — specifies that the hunt group name will be displayed on the originating extension display.
- `mbr-name` — specifies that the hunt group member name will be sent to the originating extension.

Terminating Extension Group — ISDN-PRI Applications

If the extension is part of a Terminating-Extension Group (TEG) then the voice terminal can be assigned a TEG button and associated status lamp. Furthermore, if the voice terminal has a digital display, then (depending on administration details) either the TEG group name or TEG member name can be displayed. Figure 7-89, *Terminating Extension Group Screen,* depicts this procedure.

```
                         TERMINATING EXTENSION GROUP          Page 1 of 1

        Group Number: _                           Group Extension: ___
          Group Name: _______________               Coverage Path: ____
       Security Code: ______                                  COR: 1_
 ISDN Caller Display: ______

       GROUP MEMBER ASSIGNMENTS

              Ext     Name                          Ext     Name
          1: ___                                3: ___
          2: ___                                4: ____
```

Figure 7-89. Terminating Extension Group Screen

ISDN Caller Display Specifies whether the hunt group name or the member name will be sent to the originating extension. Field encodes and their descriptions are:

- `grp-name` — specifies that the TEG group name will be sent to the originating extension.
- `mbr-name` — specifies that the TEG member name will be sent to the originating extension.

Signaling Group — ISDN-PRI Applications

R1V5 Only

When the DS1 CIRCUIT PACK screen has the *Signaling Mode* field administered as `isdn-ext`, the SIGNALING GROUP screen is used for FAS and NFAS administration. For FAS, this screen designates the D-channel used as the signal channel for all B-channels on that board.

For NFAS, this screen designates the D-channel pairs used for D-channel backup.

It also provides for the assignment of Interface IDs to DS1 interfaces within the Signaling Group.

A signaling group can correspond to more than one DS1. The DS1 CIRCUIT PACK screen shows how B-channels and their associated signaling D-channel are related. Figure 7-90, *Signaling Group Screen*, depicts this procedure.

> **NOTE:** The TRUNK GROUP screen must be used after administering this screen to assign individual trunks to trunk groups.

```
                          SIGNALING GROUP                    Page 1 of 1

Group Number: 1       Associated Signaling? n      Primary D-Channel: 1B1524
                                                 Secondary D-Channel: 1B1624

       Trunk Brd     Interface ID            Trunk Brd     Interface ID
   1:   1B15           __1           11:   ____          ___
   2:   1B16           __2           12:   ____          ___
   3:   1B17           __3           13:   ____          ___
   4:  _____           ___           14:   ____          ___
   5:  _____           ___           15:   ____          ___
   6:  _____           ___           16:   ____          ___
   7:  _____           ___           17:   ____          ___
   8:  _____           ___           18:   ____          ___
   9:  _____           ___           19:   ____          ___
  10:  _____           ___           20:   ____          ___
```

Figure 7-90. Signaling Group Screen

Group Number — A number that associates the D-channel pair used to signal for a group of trunk boards.

Associated Signaling — Assigns whether this signaling group uses FAS `(y)` or NFAS `(n)`.

Primary D-Channel — This field appears for both FAS and NFAS. For FAS, this field specifies which channel will be used as the D-channel to signal for all B-channels on that board. This channel will not signal for any other board.

For NFAS (that is, when the `Associated Signaling` field is set to `n`), this field is the D-channel assigned as the primary signaling channel for those trunk boards in this signaling group.

Secondary D-Channel — This field appears for NFAS only and specifies the D-channel assigned as the secondary (backup) signaling channel for those trunk boards in this signaling group. If the primary D-channel fails, this channel is used instead. For this reason, the secondary D-channel should be on another board than the primary D-channel.

Trunk Brd — This field appears for NFAS only and specifies the trunk boards assigned to this signaling group. All channels on these boards (except for those channels listed as the primary and secondary D-channels) are used as B-channels.

Interface ID

This field appears for NFAS only and specifies an ID that associates the D-channels allowed to signal this trunk board from the D-channels available on any trunk board.

For example, if a trunk board has a D-channel, then this board must be signaled by only one D-channel pair (that is, one signaling group). Here, this trunk board can have only one interface ID.

But if a trunk board has no D-channel (all channels are B-channels), this board can be signaled by D-channels in this and other signaling groups. This ID associates this trunk board to the D-channels that will provide signaling for it so that a board can be listed in more than one signaling group. Here, this trunk board can have several interface IDs.

Summary of Generic 1 Maintenance Capabilities

Since Generic 1 implements the same DS1, DMI, and ISDN-PRI protocols as Generic 2, both switches provide the same maintenance capabilities. Since Generic 1 DS1s provide comprehensive detection capabilities, the switch usually detects errors caused by network facilities even though an alarm will not trip.

ALARMS

Unlike analog port circuit packs, a DS1 has two categories of alarm signals: circuit-pack-level and facility. Service may be interrupted by either of these alarms. Circuit-pack-level alarms show problems with the circuit pack. Facility alarms show incorrect administration of the interface, cabling between the two switch interfaces, failures in the facility equipment, and performance of the transmission facility. (For facility problems, AT&T maintenance responsibility ends at the network interface.)

Circuit Pack Alarms

There are several types of circuit pack alarms that may arise. These are briefly described next.

Yellow LED

On power-up or initialization, the microprocessor executes a thorough set of tests on the circuit-pack hardware. During this test sequence, the green LED stays on. Failure of any of these initialization tests is shown by a flashing yellow LED. The yellow LED flashes following initialization because of power-up or software requests but does not flash if any failures are detected while the interface is online. Following successful initialization, the yellow LED not flash until the circuit pack is administered and until the D-channel is communicating with the far end. As long as the D-channel is up and communication is established, the LED stays on to show a busy state.

Red LED

The red LED is controlled by the microprocessor. During this test sequence, the green LED stays on. If any background tests fail (which the processor runs during normal online operation), the red LED is turned on. An example would be a failure of the tests run on the circuits that generate a DS1's signal. If hardware problems exist, then either the circuit pack will fail power-up initialization tests or the red LED is turned on within several seconds of power-up initialization. If the red LED remains off following initialization, a transient problem may be assumed to have occurred.

> **NOTE:** The circuit pack may fail the initialization tests for reasons other than bad hardware. Known cases are port data interface or port data store problems and synchronization subsystem problems. An example of the latter would be an online clock reference that has been externally looped to itself. These problems are evidenced by all DS1s in a module or in the system failing to initialize properly.

Facility Alarms

There are several types of facility alarms that may arise. These are briefly described next.

Excessive Slips

Data received from a DS1 facility is stored (clocked) into buffers on the circuit pack using a clock signal derived from the received signal. Data is read from the same buffers using a clock derived from the master clock. If at any time these two clocks are not phase-locked, data will be stored into the buffers at a rate different from the rate read from the buffers. This results in underflow or overflow of the buffers, called *slips.*

Slips result in the repetition or deletion of one 8-bit word for every channel. The slip rate is monitored by the circuit pack. The slip rate is used to determine if that DS1 being used as the system clock reference is functioning properly. Slips cause pops in voice and voice-grade data signals and can cause errors in digital data signals.

An example for a type of problem that will cause slips is having both switches (at each end of a DS1 facility) administered as timing masters instead of one being a master and the other using the received DS1's signal from the master as a timing reference.

Excessive Misframe and CRC Errors

Misframes and cyclic redundancy check (CRC) errors may be produced by marginal or faulty line repeaters, NCTE, noise on the transmission line, or by the circuitry that generates the framing pattern or CRC at the transmit end.

Bit errors, in a DS1's signal, are detected via misframes when D4 framing is used and via CRC errors when ESF is used.

The microprocessor keeps count of the number of misframe or CRC errors and uses the count to process the minor and major alarms. The misframe or CRC count is used in choosing clock references for the switch. Also, an unterminated transmission line could generate noise that looks like an DS1's signal. The absence of a framing pattern or continuous CRC errors is used to show that it is not a DS1.

LFA Alarm

The receive DS1's signal should contain either the D4 or ESF framing pattern. Which framing pattern is determined by administration details. The ANN35 has two green LEDs that function to show local and remote framing status. Normally, both green LEDs will be on when the near end and far end are framing properly.

When the (top) green LED is off, the near end interface cannot frame up on the DS1's signal. This event is known as the LFA alarm. The LFA alarm is also known as the *red alarm,* because a red LED lights on the D4-channel bank when this alarm is on.

D. TRUNK TYPE AND SIGNALING TYPE COMPATIBILITY TABLES

This appendix contains three tables that define trunk type to signaling type compatibility for System 85, R2V1 through R2V4, and Generic 2. Table D-1, *Trunk/Signaling Cross-references,* provides, on a trunk-type basis, the default signaling type, the feature and direction compatibility, and the valid signaling types. Table D-2, *R2V4 Alternate Signaling Type Translations*, provides, on a trunk-type basis, a translation of other than the default, valid signaling type to "standard" signaling type for R2V4 trunks. This translation is necessary to use table D-3, *Signaling Type Compatibility*. This table provides, on a signaling type basis, a compatibility matrix for the standard signaling types.

Table D-1, *Trunk/Signaling Cross-references,* shows for each trunk type what its default signaling type value is and what other possible signaling types can be assigned to it. This table is valid for System 85 R2V1 through and Generic 2. R2V4 alternate signaling types must be translated by table D-2, *R2V4 Alternate Signaling Type Translations.*

The headings for table D-1, *Trunk/Signaling Cross-references,* are defined as follows:

Trunk Description — A description of this trunk type. A signaling type or trunk type value enclosed in parenthesis such as (auto in) is not valid on a universal module.

Procedure Encode — Procedure encode for this trunk type

Feature — Defines the feature of the trunk type. Trunk types of like feature are compatible. The feature abbreviations include:

- APLT - advanced private-line termination (includes both CCSA and EPSCS)
- CAS - Centralized Attendant Service
- CO - central office
- DID - Direct Inward Dialing
- ETN - electronic tandem network
- FX - foreign exchange
- ISDN-PRI - Integrated Service Digital Network primary rate interface
- MAIN/SAT - main/satellite
- NA - Not applicable (trunk type doesn’t provide switch to switch connectivity)
- NDMI - network digital multiplexed interface
- RA - remote access
- TIE - tie trunk
- WATS - Wide Area Telecommunications Service

Direction Defines if the trunk type is capable of:

- Incoming and outgoing calls — 2-way
- Incoming calls only — 1-way in
- Outgoing calls only — 1-way out

Signaling Types The signaling types available with this trunk type. When there are several signaling types available with this trunk type, the default signaling type is listed first.

Procedure Encode The procedure encode for the listed signaling type

NOTE: Default signaling types are listed first.

LEGEND:

CAS Centralized Attendant Service
DD delay dial
DOD direct outward dial
DP dial pulse
DT dial tone
E&M ear and mouth
GS ground start
IS immediate start
LRB loop reverse battery
LS loop start
MS main-satellite
RLT release link trunk
TT touch-tone
WDDFOT wink delay dial, fail on timeout
WS wink start

TABLE D-1. Trunk/Signaling Cross References

Trunk Description	Procedure Encode	Feature	Direction	Signaling Types	Procedure Encode
intercom	0	N/A	N/A	none	0
DP digit register	1	N/A	N/A	none	0
TT digit register	2	N/A	N/A	none	0
attendant digit register	3	N/A	N/A	none	0
switched loop	4	N/A	N/A	none	0
attendant conference	(5)	N/A	N/A	none	0
general-purpose queing	6	N/A	N/A	none	0
DT detector	7	N/A	N/A	none	0
unused	8-11				
2-way CCSA DD in/out	12	APLT	2-way	E&M DD-in/wink DD-out wink-DT	9
2-way CCSA DD out, wink in	13	APLT	2-way	E&M WS in, DD out wink DT	10
2-way CCSSA DT out, DD in	14	APLT	2-way	E&M DD in, IS out	8
2-way CCSA DT out, wink in	15	APLT	2-way	E&M WS in, IS out	5
1-way in attendant completing/auto in	16	CO	1-way in	GS LS DMI/ISDN-MOS E&M auto in, IS out E&M auto in, WS out	1 19 20 28 29

TABLE D-1. Trunk/Signaling Cross References *(continued)*

Trunk Description	Procedure Encode	Feature	Direction	Signaling Types	Procedure Encode
1-way out DOD	17	CO	1-way out	GS LS DMI/ISDN-MOS E&M auto in, IS out E&M auto in, WS out	1 19 20 28 29
1-way out DOD with party test	(18)	CO	1-way out	GS party test	(2)
2-way attendant completing in, DOD	19	CO	2-way	GS LS DMI/ISDN-MOS E&M auto in, IS out E&M auto in, WS out	1 19 20 28 29
2-way with party test	(20)	CO	2-way	GS party test	(2)
1-way in attendant completing auto in	21	FX	1-way in	GS LS DMI/ISDN-MOS E&M auto in, IS out E&M auto in, WS out	1 19 20 28 29
1-way out DOD	22	FX	1-way out	GS LS DMI/ISDN-MOS E&M auto in, IS out E&M auto in, WS out	1 19 20 28 29
1-way out DOD with party test	(23)	FX	1-way out	GS party test	(2)
2-way attendant completing in, DOD	24	FX	2-way	GS LS DMI/ISDN-MOS E&M auto in, IS out E&M auto in, WS out	1 19 20 28 29
2-way with party test	(25)	FX	2-way	GS party test	(2)
1-way incoming attendant completing auto in	26	WATS	1-way in	GS LS DMI/ISDN-MOS E&M auto in, IS out E&M auto in, WS out	1 19 20 28 29
1-way out DOD	27	WATS	1-way out	GS LS DMI/ISDN-MOS E&M auto in, IS out E&M auto in, WS out	1 19 20 28 29
1-way out DOD with party test	(28)	WATS	1-way out	GS party test	(2)
auto in-WATS (not administered)	29	WATS	1-way in	GS	1
IS DID	30	DID	1-way in	LRB IS E&M IS in and out DMI/ISDN-MOS	30 4 20
WS DID	31	DID	1-way in	LRB WS E&M WS in, wink DD out DMI/ISDN-MOS	3 11 20

TABLE D-1. Trunk/Signaling Cross References *(continued)*

Trunk Description	Procedure Encode	Feature	Direction	Signaling Types	Procedure Encode
1-way in dial repeating	32	TIE	1-way in	E&M IS in, IS out	4
1-way out auto	33	TIE	1-way out	E&M IS in, auto out analog line loop	31 27
1-way out dial repeating	34	TIE	1-way out	E&M IS in, IS out GS	4 1
1-way in auto	35	TIE	1-way in	E&M auto in, IS out GS	28 1
2-way dial repeating both ways	36	TIE	2-way	E&M IS in, IS out	4
2-way dial repeating in, auto out	37	TIE	2-way	E&M IS in, auto out analog line loop	31 27
2-way auto in, dial repeating out	38	TIE	2-way	E&M auto in, IS out GS	28 1
2-way auto both ways	39	TIE	2-way	E&M auto in, auto out GS	32 1
1-way in dial repeating, DD	40	ETN	1-way in	E&M DD in, IS out	8
2-way wink in, DD or wink out	41	ETN	2-way	E&M WS in, WDDFOT out E&M WS in, wink DD out DMI/ISDN-MOS E&M WS in, WS out E&M DD in, DD out	26 11 20 21 22
1-way in, wink	42	ETN	1-way in	E&M WS in, WDDFOT out E&M WS in, Wink DD out DMI/ISDN-MOS E&M WS in, WS out E&M DD in, DD out	26 11 20 21 22
1-way out, DD or wink	43	ETN	1-way out	E&M WS in, WDDFOT out E&M WS in, wink DD out DMI/ISDN-MOS E&M WS in, WS out E&M DD in, DD out	26 11 20 21 22
2-way dial repeating-DD in	44	ETN	2-way	E&M DD in, IS out	8
2-way dial repeating in, auto out-DD in	45	ETN	2-way	E&M DD in, IS out	8
2-way DD or wink out, dial repeating DD in	46	ETN	2-way	E&M DD in, WDDFOT out E&M IS in, WDDFOT out E&M IS in, wink DD out DMI/ISDN-MOS E&M WS in, WS out	24 25 11 20 21
2-way DD in, DD out or wink out	47	ETN	2-way	E&M DD in, WDDFOT out E&M DD in, wink DD out DMI/ISDN-MOS E&M WS in, WS out E&M DD in, DD out	24 23 20 21 22
internal ANN interface	48	N/A	N/A	none	0
external ANN interface	49	N/A	N/A	none	0
remote BCS access	50	RA	1-way in	GS E&M IS in and out DMI/ISDN-MOS E&M WS in, WS out	1 4 20 21
telephone dictation interface	51	N/A	N/A	aux. equipment	7
recorded announcement interface	52	N/A	N/A	aux. equipment	7

TABLE D-1. Trunk/Signaling Cross References *(continued)*

Trunk Description	Procedure Encode	Feature	Direction	Signaling Types	Procedure Encode
code call interface	53	N/A	N/A	aux. equipment	7
loudspeaker paging interface	54	N/A	N/A	aux. equipment	7
TT sender	55	N/A	N/A	none	0
CAS interface	56	N/A	N/A	none	0
RLT for CAS	57	CAS	1-way out	E&M RLT out	13
ANI interface	58	N/A	N/A	ANI signaling	6
station msg register interface	59	N/A	N/A	none	0
unused	60				
UCD lamp interface	61	N/A	N/A	none	0
music on hold interface	62	N/A	N/A	none	0
hardware digit collection	63	N/A	N/A	none	0
voice switched gain remote access	64	N/A	N/A	none	0
LC15 contact interface	65	N/A	N/A	none	0
CAS incoming RLT	66	CAS	1-way in	E&M RLT in	14
audio	67	N/A	N/A	none	0
UCD delayed recorded announcement	68	N/A	N/A	none	0
unused	69				
1-way in IS	70	Main/Satellite	1 -way in	E&M MS IS	15
1-way out IS	71	Main/Satellite	1-way out	E&M MS IS	15
2-way IS both ways	72	Main/Satellite	2-way	E&M MS IS	15
1-way in WS	73	Main/Satellite	1 -way in	E&M MS WS	16
1-way out WS	74	Main/Satellite	1-way out	E&M MS WS	16
2-way WS both ways	75	Main/Satellite	2-way	E&M MS WS	16
1-way in DD	76	Main/Satellite	1 -way in	E&M MS DD	17
1-way out DD	77	Main/Satellite	1-way out	E&M MS DD	17
2-way DD both ways	78	Main/Satellite	2-way	E&M MS DD	17
unused	79-84				
2-way CO with voice switch gain	85	CO	2-way	none	0
1-way in-WATS with voice switch gain	86	WATS	1-way in	none	0
unused	87-89				
vectoring recorded announcement	90	N/A	N/A	aux. equipment	7
ACD recorded announcement 1	90	N/A	N/A	aux. equipment	7
ACD recorded announcement 2	91	N/A	N/A	aux. equipment	7
ACD queue of origin announcement	92	N/A	N/A	aux. equipment	7
malicious call trace recorder	93	N/A	N/A	aux. equipment	7
unused	94-97				
power meter interface	98	N/A	N/A	none	0
alarm interface	99	N/A	N/A	none	0
tone detector for modem pool	100	N/A	N/A	none	0
modem trunk for modem pool	101	N/A	2-way	analog line loop	27
pooled data module trunk for modem pool	102	N/A	2-way	S-Channel signaling	18

TABLE D-1. Trunk/Signaling Cross References *(continued)*

Trunk Description	Procedure Encode	Feature	Direction	Signaling Types	Procedure Encode
host access, 2-way, PIM	103	N/A	2-way	S-Channel signaling	18
host access off-premises, DTIM	104	N/A	2-way	S-Channel signaling	18
host access, AP32	105	N/A	2-way	S-Channel signaling	18
host access, EIA	106	N/A	2-way	S-Channel signaling	18
host access, ISN	107	N/A	2-way	S-Channel signaling	18
DMI A-bit, wink in, auto out	108	N/A	2-way	E&M WS in, IS out DMI/ISDN-MOS	5 20
DMI A-bit, 2-way wink start	109	NDMI	2-way	E&M WS in, wink DD out DMI/ISDN-MOS	11 20
unused	110-116				
reserved	117				
unused	118-119				
ISDN dynamic trunk	120	ISDN-PRI	2-way	DMI/ISDN-MOS	20

Table D-2, *R2V4 Alternate Signaling Type Translations,* translates, where needed, the R2V4 alternate signaling type for each trunk type. This allows the table D-3, *Signaling Type Compatibility,* to be used for compatibility checks. Only trunk/signaling type pair requiring translation are given. *

TABLE D-2. R2V4 Alternate Signaling Type Translations

Trunk Type	PROC Encode	R2V4 Sig. Type	G2 Equiv. Sig. Type
1-way in attendant completing/auto in	16 16	4 21	28 29
1-way out DOD	17 17	4 21	28 29
1-way out DOD with party test	18 18	4 21	28 29
2-way attendant completing in, DOD	19 19	4 21	28 29
2-way with party test	20 20	4 21	28 29
1-way in attendant completing, auto in	21 21	4 21	28 29
1-way out DOD	22 22	4 21	28 29
1-way out DOD with party test	23 23	4 21	28 29
2-way attendant completing in, DOD	24 24	4 21	28 29
2-way with party test	25 25	4 21	28 29
1-way in attendant completing, auto in	26 26	4 21	28 29
1-way out DOD	27 27	4 21	28 29
1-way out auto (Note)	33	4	27
2-way dial repeating in, auto out (Note)	37	4	27

NOTE: R2V4 must be equipped with SN243

Table D-3, *Signaling Type Compatibility,* provides the compatibility of standard signaling types. The first column is the frame of reference for the direction compatibility. Compatibility is either 1-way out, 1-way in, or bidirectional from this entry.

TABLE D-3. Signaling Type Compatibility

Encode	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
00	·																																
01		·																															
02			·																														
03				·																													
04					·	←			←				→													→			←			→	
05					→					←	←	←	·									←		←	←	·	←			←		→	
06							·																										
07								·																									
08					→					←	←	←	·										←	←	←	·	←					→	
09					→	→			→	·	·	·	·									→	·	·	·	·	·					→	
10					→	→			→	·	·	·	·									·	→	·	·	·	·			←		→	
11					→	→			→	·	·	·	·									·	→	·	·	·	·			←		→	
12					·	·			·	→	→	→	→									→	→	→	→	→	→		←			→	
13															→																		
14														←																			
15																·																	
16																	·																
17																		·															
18																			·														
19																				·													
20																					·												
21						→				←	·	·	←									·		←	←	←	·			←			
22									→	·	←	←	←										·	·	·	←	←						
23					→	→			→	·	·	·	·									→	·	·	·	·	·					→	
24						→			→	·	·	·	←									→	·	·	·	←	·						
25					←	·			·	→	→	→										→	→	→	→		→		←				
26						→			→	·	·	·	←									·	→	·	·	←	·			←			
27																												·					
28					→								→													→						·	←
29						→					→	→										→					→					←	←
30																															·		
31					←	←			←																				·	→			→
32																													→	→		←	·

The direction of compatibility is marked by:

- Two-way compatibility → One-way compatibility outgoing ← One-way compatibility incoming

Table D-4, *Signaling Type Definitions*, provides definitions for the signaling types used in the other three tables in this appendix.

TABLE D-4. Signaling Type Definitions

Procedure Encode	Trunk Description	Traditional Module Board	Universal Module Board
00	no signaling required	N/A	N/A
01	GS	SN230, ANN11	TN747B, TN767
02	GS with party test	SN230	None
03	LRB, wink start	SN232, ANN11	TN753, TN767
04	E&M IS in and out	SN233, ANN11	TN760C, TN767
05	E&M WS in, IS out	SN233, ANN11	TN760C, TN767
06	ANI signaling	SN244	None
07	auxiliary equipment	SN232	TN763B
08	E&M DD in and IS out	SN233, ANN11	TN760C, TN767
09	E&M DD in, wink/DD with DT out	SN233, ANN11	TN760C, TN767
10	E&M WS in, wink/DD with DT out	SN233, ANN11	TN760C, TN767
11	E&M WS in, wink/DD out also known as universal sequence	SN233, ANN11	TN760C, TN767
12	E&M IS in, wink/DD out	SN233, ANN11	TN760C, TN767
13	E&M RLT out	SN233, ANN11	TN760C, TN767
14	E&M RLT in	SN233, ANN11	TN760C, TN767
15	E&M MS, IS	SN233, ANN11	TN760C, TN767
16	E&M MS, WS	SN233, ANN11	TN760C, TN767
17	E&M MS, DD	SN233, ANN11	TN760C, TN767
18	S-Channel signaling, host access-GPP S-Channel signaling, host access-EIA	SN270, SN238	TN754, TN726
19	LS	ANN11	TN767
20	DMI/ISDN-MOS	ANN35	TN767/TN555 pair
21	E&M WS in, WS out	SN233, ANN11	TN760C, TN767
22	E&M DD in, DD out	SN233, ANN11	TN760C, TN767
23	E&M DD in, wink/DD out	SN233, ANN11	TN760C, TN767
24	E&M DD in, WDDFOT	SN233, ANN11	TN760C, TN767
25	E&M IS in, WDDFOT	SN233, ANN11	TN760C, TN767
26	E&M WS in, WDDFOT	SN233, ANN11	TN760C, TN767
27	analog line loop	SN243	TN742
28	E&M auto in, IS out	SN233, ANN11	TN760C, TN767
29	E&M auto in, WS out	SN233, ANN11	TN760C, TN767
30	LRB IS	SN232, ANN11	TN753, TN767
31	E&M IS in, auto out	SN233, ANN11	TN760C, TN767
32	E&M auto in, auot out	SN233, ANN11	TN760C, TN767

*

E. TIE TRUNK SETTINGS

This appendix contains the ISDN-PRI-specific administration settings that must be assigned to enable DEFINITY® Generic 1.1 to System 85 R2V4 communications systems to communicate via ISDN-PRI tie trunks.

System 85 Administration Settings

Table E-1, *System 85 R2V4 Administration Settings,* shows the basic System 85 administration settings needed to implement ISDN-PRI tie trunks between the two communications systems. The administration procedures are shown in the order they should be set.

See chapter 7, *Administration Options and Requirements,* for additional information on ISDN-PRI administration issues. See *AT&T System 85 Release 2, Version 4, Feature Translations,* Issue 1, July 1987, 555-103-107, for further details on each of the procedures listed in table E-1 and how to administer the switch.

NOTE: Table E-1, *System 85 R2V4 Administration Settings,* is not a complete enumeration of the required administration settings. It highlights those settings that are particular to the ISDN-PRI interface between the two systems.

NOTE: Sometimes, the analogous administration fields and screens in Generic 1 are stated for a given procedure word and field. These analogies are usually not one-for-one. For example, a given procedure word and field may correspond to only parts of one or more Generic 1 screens and fields.

TABLE E-1. System 85 R2V4 Administration Settings

PROCEDURE	WORD	FIELD	REMARKS
275	4	14	A `1` must be set in this field to enable the ISDN feature. The analogous Generic 1 administration is in the `ISDN-PRI` field of the SYSTEM PARAMETERS - CUSTOMER OPTIONS screen.

TABLE E-1 *(continued).* System 85 R2V4 Administration Settings

PROCEDURE	WORD	FIELD	REMARKS
260	1	1-4	Enter the address of the ANN35 that you want to administer. The analogous Generic 1 administration is in the `Location` field of the DS-1 CIRCUIT PACK screen.
		6	This field is to assign either D4 or ESF (Fe) framing format. ESF framing should be assigned here. If ESF is assigned and if the ESF T1 CSU is optioned to pass ESF through transparently, then the misframes registered in procedure 620 are a count of the CRC-6 errors. At present, no standard exists to show acceptable ranges of CRC-6 errors. ESF framing is especially important in data applications because it can reframe automatically on a loss of frame alignment. A D-4-framed DS-1 can be reframed only by returning all channels to the idle state. The analogous Generic 1 administration is in the `Framing Mode` field of the DS-1 CIRCUIT PACK screen.
		7	Assign `PCS` in this field. (This stands for per channel signaling.) The analogous setting in Generic 1 is automatic when ISDN-PRI is used.
		8	Assign 24th channel signaling here. Robbed bit signaling (RBS) is not allowed. This administration is analogous to the `Signaling Mode` field of the DS-1 CIRCUIT PACK screen in Generic 1.
		9	Assign either ZCS or B8ZS here. The ISDN-PRI specification recommends B8ZS. Currently, not all facility equipment is necessarily B8ZS compatible. ZCS is sometimes referred to as AMI (alternate mark inversion). Also, B8ZS is required if this trunk is used for 64K-bps unrestricted data. The analogous Generic 1 administration is in the `Zero Code Suppression` field of the DS-1 CIRCUIT PACK screen.
		10	This is the slip count enable field. It should be assigned according to the overall synchronization plan. The analogous Generic 1 administration is in the `Slip Detection` field of the DS-1 CIRCUIT PACK screen.

TABLE E-1 *(continued).* System 85 R2V4 Administration Settings

PROCEDURE	WORD	FIELD	REMARKS
260	1	11	This field is for loop around testing. External loop around should be enabled only during a maintenance test. The analogous Generic 1 administration is in the `Remote Looparound Test` field of the DS1 CIRCUIT PACK screen.
		12	The setting for this field depends on whether the ISDN-PRI circuit pack is a timing source. This field must be set consistent with the overall synchronization plan, which is developed according to current methods and procedures.
		13	The setting for this field depends on whether the ISDN-PRI circuit pack is a timing source. This field must be set consistent with the overall synchronization plan, which is developed according to current methods and procedures. The analogous Generic 1 administration is in the `Synchronization Source` field of the SYNCHRONIZATION screen.
		14	Assign a `5` for ISDN/PRI in this field.
		15	Assign a hyphen `(–)` here. This setting is for use when ZCS line coding is used. If for some reason B8ZS is assigned in field 9, then you must assign a `0` for no bit inversion on the D-channel because Generic 1 never inverts the bits with B8ZS and the two systems must agree.
262	1	1-4	Assign the ANN35 to the proper module, cabinet, carrier, and slot. The analogous Generic 1 administration is the command `add ds1 <parameters>.`
		6	Assign a `0` here for user or a `1` for network. When connected to another communications system, one communications system is user and the other is network. Thus, if you assign a System 85 R2V4 as network, you must administer the Generic 1 as `user.` The analogous Generic 1 administration is in the `interface` field of the DS-1 CIRCUIT PACK screen.

TABLE E-1 *(continued).* System 85 R2V4 Administration Settings

PROCEDURE	WORD	FIELD	REMARKS
262	1	7	Assign a `3` here if a System 85 is equipped with an SN261, analog/digital facility test circuit pack. If an SN261 is not present, assign a `1` here. A `3` allows level 2 and 3 tests in procedure 648. A `1` allows only level 2 tests.
		8-12	These fields are for the terminal endpoint identifier and various timers and counters. They are assigned default values when the ANN35 board is assigned in procedure 260. Except for one case, the default values are usually adequate. When connected to a duplicated Generic 1, however, field 10 should be set to a value of 6 to avoid an alarm when Generic 1 switches processors.
280	1	13	For each ANN35 and TN767 containing a D-channel in an nonfacility associated signaling (NFAS) arrangement, assign an interface identifier here. This field is used to populate the ISDN channel ID information element (IE).
054	1		Assign an extension range to the SN261 (ADFTC) that will be used for ISDN testing from the far-end communications system. This extension corresponds to the number assigned in the TRUNK GROUP screen on Generic 1 for ISDN test calls. Fields 6 and 7 should be assigned `ADFTC.` (Stations are defined in procedure 000, word 1.) The analogous Generic 1 administration is in the `ISDN Test Call` field in the MAINTENANCE-RELATED SYSTEM PARAMETERS screen.
108	1		Assign the test number to call on the far-end communications system to do ISDN-PRI tests. This number is mapped according to the dial plan to the extension assigned in the MAINTENANCE-RELATED SYSTEM PARAMETERS screen on Generic 1. The analogous Generic 1 administration is in the `Far End Test No` field of the TRUNK GROUP screen.
354	3		Assign the NPA and NXX designators here. The NPA is the area code in which this System 85 R2V4 resides. The NXX is a local exchange office code used by the system. The designator is an index used in procedure 000 to identify an area code and office code with a particular station. This information is used to populate the calling party number IE and the connected party number. The analogous Generic 1 administration is in the SID PREFIX TABLE screen.

TABLE E-1 *(continued).* System 85 R2V4 Administration Settings

PROCEDURE	WORD	FIELD	REMARKS
000	4	4	Assign the NPA and NXX index for the terminal extension number. This information is used to populate the calling party number field in a connect party number ISDN-PRI message. The analogous Generic 1 administration is in the SID PREFIX TABLE screen.
010	4	3	For each terminal class of service (COS) on a System 85, assign either mode 0, 1, 2, or 3 data, or voice/voice-grade data. The assignments here are responsible for populating the bearer capability (BC) IE in the ISDN-PRI messages. This is used for interworking between ISDN and non-ISDN trunks and endpoints and also for routing calls based on BC. For example, if you want only mode 1 terminal extensions to use a certain trunk group, mode 1 is assigned to the COS for that terminal and the preference is also assigned mode 1 in procedure 321 word 1 and/or 309 word 5. If you want a terminal to have more than one BC, it must have more than one extension. An analogous Generic 1 administration does not exist because the Generic 1 automatically determines the BC of its endpoints without administration. The BCC value appears as read only, however, on the STATION and DATA MODULE screens.
		4	Use this field to assign which terminals can/cannot use ISDN facilities. For example, you may want to assure the caller (a company executive, for instance) that a call is going over ISDN facilities. You have the option here to have calls from a particular extension routed only over ISDN facilities, only over non-ISDN facilities, or over either, depending on the availability of ISDN facilities when the call is made. An analogous Generic 1 administration does not exist although an all-ISDN route can be set up using AAR/ARS partitioning.
100	1	6	Assign trunk type 41 if TCMs are passed. The analogous Generic 1 administration is in the `Service Type` field of the TRUNK GROUP screen.

TABLE E-1 *(continued).* System 85 R2V4 Administration Settings

PROCEDURE	WORD	FIELD	REMARKS
100	3	2	Use ISDN signaling type, which is type 20. The analogous Generic 1 administration is in the `Group Type` field of the TRUNK GROUP screen.
		3	Glare control is automatically handled with ISDN trunks and does not have to be administered.
		4	Assign a `1` here if you have assigned trunk types 41, 42, 43, 46, or 47.
		7	This field is used to set the number of errors allowed over two 5-minute intervals before automatic busyout. You can set any number from 1 to 99. If you are assigning this number for use in a test, set it to `1`.
		8	Assign a `1` in this field if you do not want optional IEs sent, or to a `0` if you do want these sent. Either all will be sent or none will be sent, depending on the setting. These optional IEs are: • Connected number • User-user • Calling party number • Display • Logical link identification • Traveling class mark • Link layer parameters • Packet layer parameters • Look-Ahead Interflow The calling party number option will populate the ISDN-PRI setup message with the information necessary to deliver SID to the called party. User-to-user information is not yet available. When available, it will allow discretionary information to be passed from the calling party to the called party in various ISDN-PRI messages. The analogous Generic 1 administration for the calling/connected party number is the `Send SID` field of the TRUNK GROUP screen. The analogous Display IE administration is in the `Send Name` field of the TRUNK GROUP screen.

TABLE E-1 *(continued).* System 85 R2V4 Administration Settings

PROCEDURE	WORD	FIELD	REMARKS
101	1	17	Assign AVD to all trunk groups that will be used for digital data calls to and from Generic 1. Do not assign AVD if the trunk group is to be used for voice-grade data using the modem pool feature. You cannot mix digital data and modem pooled data on the same trunk groups in R2V4. In Generic 2, this is be possible because of BCCOS. You can put voice-grade data on the digital data trunk groups if the modems are not automatically inserted by the modem pool feature. For example, if you have a modem on your terminal you can use the same trunk groups as used for the digital data.
103	1	3	This field and field 4 should be set to `1` if TCMs are to be sent and received. The trunk type should be type 41. The analogous Generic 1 administration is in the `Service Type` and `Service/Feature` fields of the TRUNK GROUP screen.
		4	This field and field 3 should be set to `1` if TCMs are to be sent. The trunk type should be type 41. The analogous Generic 1 administration is in the `Service Type` and `Service/Feature` fields in the TRUNK GROUP screen. If TCMs are to be sent here, use `TANDEM` trunks; otherwise, use `ACCESS` trunks.
		9	Enter the AAR or ARS prefix digit here. On incoming calls, this setting routes calls to AAR or ARS. The analogous Generic 1 administration is in the `Incoming Call Handling Table` fields on page 2 of the TRUNK GROUP screen (see table E-8).
		14	Assign a `1` here for all ISDN trunks. This is to collect all digits before seizing trunks. The analogous Generic 1 administration is in the preferences in the ROUTING PATTERN screen. Digits are all collected starting with the first ISDN-PRI preference in a pattern and for all subsequent preferences, whether they are ISDN-PRI trunk groups or not. Thus, you can achieve the same effect as this procedure does in the Generic 1 by assigning an ISDN-PRI preference as the first preference in a pattern.

TABLE E-1 *(continued).* System 85 R2V4 Administration Settings

PROCEDURE	WORD	FIELD	REMARKS
103	1	15	This field applies to calls incoming on this trunk group. If non-ISDN trunks are to interwork with ISDN trunks, then the non-ISDN trunks may have their BCs assigned here. An example would be a non-ISDN data call coming into a System 85 that is tandemed to an outgoing ISDN trunk bound for a Generic 1. Here, the incoming trunk should have its BC set so that the far-end knows what mode of data it is. The analogous Generic 1 administration is in the `BCC` field for trunk groups set as comm type `AVD` or `data` in the TRUNK GROUP screen.
116	1	10	When connected to a Generic 1, the interface endpoint is PBX. Thus, assign a `0` here. The analogous Generic 1 administration is in the `connect` field of the DS-1 CIRCUIT PACK screen.
210	2		Assign the Listed Directory Number (LDN) and NPA-NXX designator for the attendant console in this procedure.
309			This procedure (for ARS) and procedure 321 (for AAR) implement the private networking capabilities between System 85 R2V4 and Generic 1. Fields relating to either ISDN-PRI or to the dial plan are discussed below.
	1	8	For calls going out trunk groups bound for a Generic 1 via private tie trunks, a 1 should not be sent. Thus, put a `0` in this field. The analogous Generic 1 administration is the prefix digit in the ROUTING PATTERN screen.
		10	This field is part of the subnet trunking feature. If you want to dial a Generic 1 with public network numbers (NPA-NXX-XXXX) but route the call over private tie trunks, you must delete all the digits except for the station numbers. This field works with procedure 309, words 3 and 4. Also, procedure 103, word 4, must be set to `1` to allow subnet trunking. The analogous Generic 1 administration is in the `No. Deleted Digits` and `Inserted Digits` fields in the ROUTING PATTERN screen.

TABLE E-1 *(continued).* System 85 R2V4 Administration Settings

PROCEDURE	WORD	FIELD	REMARKS
309	1	11	For all ISDN-PRI trunk groups, this field should be 0.
		12	This field does not apply to the configuration and application discussed in this appendix because a System 85 R2V4 is connected to another communications system via private lines. If it is connected to a 4 ESS, 288 would be entered here, which is the AT&T network. Thus, you can leave this field blank for tie trunk groups connecting to a Generic 1.
	5	4	This field applies only to ISDN Dynamic trunk type 120. For the configuration and application described in this appendix, dedicated trunk groups should be used. A - should be assigned in this field.
		5	This field applies to connections to central office or toll switches, not to connections to other private communications systems. A - should be assigned here.
		6-10	Use these fields to assign BCs to be supported by preferences. For example, if you want a trunk group to be used for mode 0 and mode 1 calls only, assign mode 0 and mode 1 to all appropriate preferences containing that trunk group. If the BC of the originating terminal does not match that of the preference, that preference will be skipped over. The analogous Generic 1 administration is in the BCC fields in the ROUTING PATTERN screen.
321	1		Administer the same as procedure 309, word 1.
	5		Administer this procedure the same as you would proc 309, word 5. The only difference is you are using AAR patterns instead of ARS patterns.
107			ATMS terminating test line digits for and station features.
106			This procedure is display only. It shows far-end maintenance busyout, near end ISDN busyout, and far-end ISDN busyout.

Generic 1 Administration Settings

This section describes the ISDN-PRI-specific administration settings for a Generic 1 connected to a System 85 R2V4 in the configuration shown in Figure 1. Each required administration screen is shown with an example of the appropriate settings. After each screen is a table explaining each of the settings related to ISDN-PRI. Fields not discussed in the table do not relate directly to the configuration shown in figure 1. Typical settings for these fields are shown in the examples, though they are not required for this interface.

For those fields of a screen not discussed in the tables following these screens, you can assume that the settings shown are reasonable. They are the settings used by a customer having a System 85 R2V4 connected to a Generic 1 with ISDN-PRI tie trunks. The only significant difference between the configuration discussed in this appendix and the configuration administered in the sample screens is that the customer has DCS implemented over the ISDN-PRI trunks.

Administration Summary

Before administering a Generic 1, you should have the dial plan completed.

Following is a summary of the administration screens specific to this configuration, listed in a suggested order they should be administered. Not all screens are order-dependent, but if you follow this suggested order you should not encounter any order-related administration problems.

Refer to *DEFINITY® 75/85 Communications System, Generic 1 and System 75 Administration/Measurements*, Issue 4, February 1989, 555-200-500 for the administration commands applicable to each of these screens.

1. System Parameters - Customer Options
2. Feature-Related System Parameters
3. Maintenance-Related System Parameters
4. Dial Plan Record
5. DS-1 Circuit Pack
6. Synchronization Plan
7. Processor Interface Data Module
8. Interface Links. (Fill in all but the `enable` fields.)
9. Processor Channel Assignment
10. Interface Links. (Enable the interface links.)
11. Signaling group (R1V5 only)
12. Trunk Group
13. Various routing screens (RNX, HNPA, FNPA, RHNPA)
14. Routing Pattern
15. SID Prefix Table
16. Hunt Group
17. Terminating Extension Group

System Parameters — Customer Options Screen Settings

The administration for this screen is done remotely by the Customer Service Support Organization (CSSO) of the Network Operations Group (NOG). It enables the optional features of a Generic 1.

Following is an example of typical settings for this screen when a Generic 1 is connected to a System 85 R2V4 via ISDN-PRI tie trunks:

```
                          OPTIONAL FEATURES

 Abbreviated Dialing Enhanced List? n                    Hospitality? y
                               ACD? y   Hospitality Parameter Reduction? n
                               ARS? y                       ISDN-PRI? y
                  ARS Partitioning? y                            OCM? n
               Authorization Codes? y              Private Networking? y
                        CAS Branch? y              Service Observing? y
                          CAS Main? n   Ten to Seven Digit Conversion? y
                               DCS? y            Time of Day Routing? n
     Emergency Access to Attendant? n            Uniform Dialing Plan? y
     Forced Entry of Account Codes? n

         (NOTE: You must logoff & login to effect the permission changes.)
```

Figure E-1. OPTIONAL FEATURES Screen

Table E-2, *System Parameters - Customer Options Screen Administration — Generic 1,* describes the administration settings for the fields of this screen relevant to the configuration shown in figure 1:

TABLE E-2. System Parameters - Customer Options Screen Administration — Generic 1

FIELD	SETTING	REMARKS
ARS		ARS is required if you are using Ten-Digit-to-Seven-Digit Conversion. If you are using subnet trunking or uniform dial plan with the ISDN-PRI trunk to a System 85, you need either AAR (PNA) or ARS.
ARS Partitioning	Y	This field is factory-set to y if ARS is ordered.

TABLE E-2 *(continued).* System Parameters — Customer Options Screen Administration — Generic 1

FIELD	SETTING	REMARKS
ISDN-PRI	Y	A y here turns on ISDN-PRI. ISDN-PRI software is ordered by specifying attribute use 6 when ordering the TN767 DS-1 circuit pack.
Private Network Access (PNA)	Y	PNA is analogous to AAR on System 85. Either this or ARS software is required for ISDN-PRI. If the Ten-Digit-to-Seven-Digit Conversion feature is used, you must have PNA and ARS. If you use the Subnet Trunking feature, you need either PNA or ARS. If you use the UDP feature, you do not need PNA. UDP software is a separate PEC having no prerequisite.
Ten-Digit-to-Seven-Digit-Conversion	Y	This option is not strictly required. It allows you to dial the public network number of an endpoint on a System 85 but route the call over the private ISDN-PRI tie trunk by converting the public network number to a private network number. To administer this option, ARS and UDP or PNA must be enabled. All entries on the TEN-DIGIT TO SEVEN-DIGIT CONVERSION screen must be assigned. Instructions for doing this can be found in *DEFINITY® 75/85 Communications System, Generic 1 and System 75 Implementation,* Issue 1, February 1989, 555-204-654. See pages 4-23 and 6-176.
Uniform Dialing Plan	Y	This option is not strictly required. It is useful in setting up a uniform four or five digit dial plan between a System 85 R2V4 and a Generic 1. This feature works by converting an extension number to an RNX plus an extension number. To administer UDP, see *DEFINITY® 75/85 Communications System, Generic 1 and System 75 Implementation,* Issue 1, February 1989, 555-204-654. See pages 3-243, 4-20, 4-28, 5-68, 6-73, 6-163, and 6-164.

Feature-Related System Parameters Screen Settings

Following is an example of typical settings for this screen when a Generic 1 is connected to a System 85 R2V4 via ISDN-PRI tie trunks:

```
FEATURE-RELATED SYSTEM PARAMETERS
                                    Trunk-to-Trunk Transfer? y
 Coverage - Don't Answer Interval for Subsequent Redirection (rings): 2
                    Coverage — Caller Response Interval (seconds): 4
                                  Keep Held SBA at Coverage Point? y
          Automatic Callback — No Answer Timeout Interval (rings): 4
                              Call Park Timeout Interval (minutes): 10
              Off-Premises Tone Detect Timeout Interval (seconds) : 25
                                        AAR/ARS Dial Tone Required? y
                                               Music On Hold Port:
                    Music (or Silence) on Transferred Trunk Calls? no
                                 DID/Tie/ISDN Intercept Treatment: 67987
                        Messaging Service Adjunct (MSA) Connected? n
                        Automatic Circuit Assurance (ACA) Enabled? y
                                               ACA Referral Calls: remote
                                     ACA Remote PBX Identification: 3
```

Figure E-2. FEATURE-RELATED SYSTEM PARAMETERS Screen

The only ISDN-PRI-related field in this screen is the `DID/Tie/ISDN Intercept Treatment` field. You should enter the extension of the recorded announcement you want to use for intercept treatment for invalid ISDN-PRI calls. This field defaults to `0` to go to the attendant.

Maintenance-Related System Parameters Screen Settings

This screen is primarily for use by maintenance personnel. Following is an example of typical settings when a Generic 1 is connected to a System 85 via ISDN-PRI tie trunks:

```
                  MAINTENANCE-RELATED SYSTEM PARAMETERS

MAINTENANCE THRESHOLDS (Before Notification)

   Minimum Threshold for TTRs: 12        Minimum Threshold for CPTRs: 6

TERMINATING TRUNK TRANSMISSION TEST ( Extension )

Test Type 100: 67380    Test Type 102: 67382    Test Type 105: 67385

ISDN TEST CALL

   Extension: 67920

LOSS PLAN ( Leave Blank if no Extra Loss is Required )

Minimum Number of Parties in a Conference Before Adding Extra Loss:
```

Figure E-3. MAINTENANCE-RELATED SYSTEM PARAMETERS Screeen

The only ISDN-PRI-specific field in this screen is the `ISDN Test Call Extension` field. You should enter the extension that this System 85 R2V4 should call when it does an ISDN test. This screen is described in detail in *DEFINITY® 75/85 Communications System, Generic 1 Installation and Test,* Issue 1, February 1989, 555-204-104, chapter 6 *(Activate System).*

Dial Plan Record Screen Settings

This screen does not directly relate to the use of ISDN-PRI trunks. It must be completed, however, to implement the dial plan between the two communications systems. If UDP is used, the DIAL PLAN RECORD screen has two parts. The first part is page 1. The second part consists of pages 2-6. The second part is the UDP screen administration. For details on how to administer these screens, see *DEFINITY® 75/85 Communications System, Generic 1 and System 75 Implementation,* Issue 1, February 1989, 555-204-654, pages 5-68 - 5-74 *(Dial Plan).* Also refer to *DEFINITY® 75/85 Communications System, Generic 1 and System 75 Feature Description,* Issue 5, February 1989, 555-200-201, pages 3-257 - 3-259 *(Dial Plan* and 3-457 - 3-461 *(Single Digit Dialing and Mixed Station Numbering).*

```
                              DIAL PLAN RECORD

                            Area Code: 619
                      ARS Prefix 1 Required? n
                       Uniform Dialing Plan? y       Plan Length: 5
FIRST DIGIT TABLE
First                                 Length
Digit  - 1 -       - 2 -       - 3 -       - 4 -       - 5 -       - 6 -
  1:             fac         tac
  2:                                                 extension
  3:                                                 extension
  4:                                                 extension
  5:                                                 extension
  6:                                                 extension
  7:                                                 extension
  8:  fac
  9:  fac
  0:  attendant
  *.             fac
  #:             fac
```

Figure E-4. DIAL PLAN RECORD Screen

DS1 Circuit Pack Screen Settings

For details on how to administer this screen, see *DEFINITY® 75/85 Communications System, Generic 1.1 and System 75 Implementation,* Issue 1, February 1989, 555-204-654. See page 4-51, *(DS-1 Circuit Pack).* In addition, see pages 3-132, 4-123, 5-159, 6-91, 6-126 and 6-168 for other required information.

Following is an example of typical settings for this screen when a Generic 1 is connected to a System 85 R2V4 via ISDN-PRI tie trunks:

```
                              DS1 CIRCUIT PACK

           Location: 1C19                          Name : TG 92 TO KM4
   Line Compensation: 1              Zero Code Suppression: zcs
        Framing Mode: esf                   Signaling Mode: isdn-pri
                                                   Connect:  pbx
                                                 Interface: user


                          MAINTENANCE  PARAMETERS

      Slip Detection? y            Remote Loop-Around Test? n
```

Figure E-5. DS1 CIRCUIT PACK Screen

Table E-3, *DS-1 Circuit Pack Screen Settings — Generic 1*, describes the administration settings for the ISDN-PRI-specific fields in this administration screen.

TABLE E-3. DS-1 Circuit Pack Screen Settings — Generic 1

FIELD	SETTING	REMARKS
Line Compensation		Assign a number from 1 - 5, depending on the length of the cable from the TN767 to the ESF T1 CSU as follows: 1 (0 to 133 feet), 2 (133 to 266 feet), 3 (266 to 399 feet), 4 (399 to 533 feet), or 5 (533 to 655 feet). Note that if you are using the old 551V CSU, the maximum distance to the CSU is 85 feet.
Framing Mode	esf	ESF is recommended with all ISDN-PRI applications. The System 85 R2V4 on the far end must also be optioned for ESF. The other option is D4 framing. If D4 framing is used, the far end must also be D4-framed.

TABLE E-3 *(continued).* DS-1 Circuit Pack Screen Settings - Generic 1

FIELD	SETTING	REMARKS
Zero Code Suppression	zcs	Unless you have requested unrestricted facilities from the local exchange T1 facility, you should assign zcs here. If you are guaranteed unrestricted facilities all the way from the Generic 1 to the far-end System 85 R2V4, then you should assign b8zs here. The System 85 R2V4 should be administered for the same option as a Generic 1. ZCS causes an inverted D-channel. B8ZS results in a non-inverted D-channel. The analogous System 85 R2V4 administration is in procedure 260, word 1, field 15.
Signaling Mode	isdn-pri	If isdn-pri is entered here, the Connect field (see below) appears with its default value of network.
	isdn-ext	(R1V5 only) If isdn-ext is entered here for FAS/NFAS, the Connect and Interface fields (see below) do not appear. (The SIGNALING GROUP screen is used to administer D-channel related data.)
Connect	pbx	This field defaults to network if the signaling mode is isdn-pri. You must change this to pbx because the far end is a System 85 R2V4. After entering pbx, the interface field is displayed.
Interface		Enter user or network. One system must be administered for user and the other for network. This field is for glare control. The analogous System 85 R2V4 administration is in procedure 262, word 1, field 5.
Slip Detection	Y	A y should be assigned if a Generic 1 is a synchronization source. The analogous System 85 R2V4 administration is in procedure 260, word 1, field 13.

Synchronization Plan Screen Settings

This screen must be administered to be consistent with the overall synchronization plan of the network in which the two systems reside. Consistent with current methods and procedures, an AT&T entity has responsibility for generating the synchronization plan. For further information on this subject, refer to *DEFINITY® 75/85 Communications System, Generic 1 and System 75 Implementation,* Issue 1, February 1989, 555-204-654, page 5-159 *(Synchronization Plan).*

Processor Interface Data Module Screen Settings

The Generic 1 interface to ISDN-PRI requires a synchronous/asynchronous processor interface circuit pack (TN765). Each TN765 has four ports (links) for supporting BX.25 and/or ISDN applications. Up to two TN765 (8 links) are possible in a multiple carrier cabinet or one (4 links) in a single carrier cabinet. The TN765 has data modules (PDMs) integrated into its ports. These processor interface data modules must have extensions assigned to them just as if they were external MPDMs. This screen is used to administer these extensions. See *DEFINITY® 75/85 Communications System, Generic 1 and System 75 Implementation,* Issue 1, February 1989, 555-204-654, page 5-148 *(Processor Interface Data Module),* for further information. Following is an example of this screen when a Generic 1 is connected to a System 85 R2V4 via ISDN-PRI tie trunks:

```
                                DATA MODULE                Page  1 of 1

  Data Extension: 67967            Type: procr-intf     Physical Channel: 2
            Name:                   COS: 1                  COR: 1
                     Maintenance Extension:


ABBREVIATED DIALING

  List1:

HOT LINE DESTINATION
     Abbreviated Dialing Dial Code (From above list):

ASSIGNED MEMBERS ( Stations with a data extension button for this data module )

         Ext     Name                          Ext     Name
      1:                                    3:
      2:                                    4:
```

Figure E-6. DATA MODULE Screen

Table E-4, *Processor Interface Data Module Screen Settings — Generic 1,* describes the administration settings for this screen.

TABLE E-4. Processor Interface Data Module Screen Settings — Generic 1

FIELD	SETTING	REMARKS
Data Extension		You must assign a data module extension to the physical channel to be used for the ISDN-PRI link to the far-end System 85 R2V4. Any valid extension can be used here and does not require coordination with the System 85. Use the system command `add data-module (extension)`.
Type	procr-intf	
Physical Channel		Enter the physical channel number (01 - 08) to which you assigned the data extension.
Name		This field is optional. Enter something showing that the system associated with this channel is the far end System 85.

Interface Links Screen Settings

Refer to links 2 and 4 in the example below.

Following is an example of typical settings for this screen when a Generic 1 is connected to a System 85 R2V4 via ISDN-PRI tie trunks:

```
                                INTERFACE LINKS

                        Est    PI                  Destination      DTE/
    Link    Enable      Conn   Ext      Prot    Digits     Brd      DCE    Identification
     1:       n          n              BX25                        DTE
     2:       Y          Y    67967     ISDN               1C19            ISDN #1 KM
     3:       n          n              BX25                        DTE
     4:       Y          Y    67965     ISDN               1A06            ISDN #2 KM
     5:       Y          Y    67954     BX25    67953               DTE    AUDIX
     6:       Y          Y    67980     BX25    67981               DCE    DCIU #6 KM
     7:       Y          Y    67982     BX25    67983               DCE    DCIU #7 BB 2
     8:       n          n              BX25                        DTE
```

Figure E-7. INTERFACE LINKS Screen

Table E-5, *Interface Links Screeen Settings — Generic 1,* describes the administration settings for the ISDN-PRI-specific fields in this administration screen.

TABLE E-5. Interface Links Screen Settings — Generic 1

FIELD	SETTING	REMARKS
Enable		Do not enable any links until all other fields in this screen and all fields in the Processor Channel Assignment have been administered. After administering these other fields, come back to this screen. Enter a y next to the link corresponding to the physical channel number assigned in the PROCESSOR DATA MODULE screen to enable that link.
Est Conn	Y	For ISDN-PRI links, the correct entry is always y.
PI Ext		This is a display-only field. It should display the extension of the processor interface data module assigned in the PROCESSOR INTERFACE DATA screen.
Prot	isdn	This field is used to set either ISDN-PRI or BX.25 protocol. Here, ISDN-PRI is used.
Destination		Leave the digits field blank. In the brd field, enter the board address, e.g., 1C19, of the TN767 corresponding to the link. The TN767 must have previously been administered as using ISDN signaling in the DS-1 CIRCUIT PACK screen. This address can only appear once in this screen.
DTE/DCE		Leave this field blank. It only applies to links using BX.25 signaling.
Identification		Enter a one to fifteen character name for the link identifying the far end System 85 as the destination machine. This field is used only for identification and can be left blank.

Processor Channel Assignment Screen Settings

This screen assigns processor channels to interface links. The processor channel should not be confused with the physical channel used in the PROCESSOR DATA MODULE screen. 64 processor channels are available.

Following is an example of typical settings for this screen when a Generic 1 is connected to a System 85 R2V4 via ISDN-PRI tie trunks:

```
              PROCESSOR CHANNEL ASSIGNMENT

 Proc          Interface              Remote
 Chan  Appl.   Link  Chan  Priority   Proc Chan  Machine-ID
   1:
   2:
   3:
   4:
   5:
   6:
   7:
   8:
   9:
  10:  isdn     2            h
  11:  isdn     4            h
  12:
  13:
  14:
  15:
  16:
```

Figure E-8. PROCESSOR CHANNEL ASSIGNMENT Screen

Table E-6, *Processor Channel Assignment Screen Settings — Generic 1*, describes the administration settings for the ISDN-PRI-specific fields in this administration screen.

TABLE E-6. Processor Channel Assignment Screen Settings — Generic 1

FIELD	SETTING	REMARKS
Proc Chan		This field is display only.
Appl.	isdn	This is the application type that connects to this processor channel.
Interface Link		Enter the interface link number assigned in the INTERFACE LINKS screen. In the screen examples, ISDN was assigned to links 2 and 4.
Interface Channel		This field does not apply to ISDN processor channels and must be left blank.
Priority	h	The ISDN application always uses high (h) priority.
Remote Proc Chan		This field does not apply to ISDN processor channels and must be left blank.
Machine-ID		This field does not apply to ISDN. Leave it blank.

Trunk Group Screen Settings

This screen is used to administer the ISDN-PRI trunk group.

Following is an example of typical settings for this screen when a Generic 1 is connected to a System 85 R2V4 via ISDN-PRI trunks:

```
                                TRUNK GROUP

Group Number: 92              Group Type: isdn-pri        SMDR Reports? y
  Group Name: ISDN-Daley             COR: 32                       TAC: 192
   Direction: two-way      Outgoing Display? n
 Dial Access? n              Busy Threshold: 60           Night Service:
Queue Length: 0
Service Type: tandem

                           Far End Test No: 5767999
TRUNK PARAMETERS
 Send Display/TCM in codeset 6/7: 7
        Max message size to send: 128



     Connected to Toll? n     STT LOSS: low         DTT to DCO Loss: low

              Bit Rate: 1200        Synchronization: async    Duplex: full
```

Figure E-9. TRUNK GROUP Screen — Page 1

```
TRUNK FEATURES
          ACA Assignment? y         Long Holding Time (hours): 1
  Short Holding Time (sec): 3         Short Holding Threshold: 10
            MIS Measured? n
            Used for DCS? y    PBX ID: 3    Data Restriction? n
       Maintenance Tests? y                         Send SID? y
                                                   Send Name? y

 Service/       Called     Called         Del  Insert          Per Call  Night
 Feature         Len       Number                               SID/ANI   Serv.
 tandem           7                             8                          67998
```

Figure E-10. TRUNK GROUP Screen — Page 2

```
GROUP MEMBER ASSIGNMENTS

                      Port    Name        Night
                  1: 1C1901  imt001
                  2: 1C1902  imt002
                  3: 1C1903  imt003
                  4: 1C1904  imt004
                  5: 1C1905  imt005
                  6: 1C1906  imt006
                  7: 1C1907  imt007
                  8: 1C1908  imt008
                  9: 1C1909  imt009
                 10: 1C1910  imt010
                 11: 1C1911  imt011
                 12: 1C1912  imt012
                 13: 1C1913  imt013
                 14: 1C1914  imt014
                 15: 1C1915  imt015
```

Figure E-11. TRUNK GROUP Screen — Page 3

Table E-7, *Trunk Group Screen Settings — Generic 1,* describes the administration settings for the ISDN-PRI-specific fields in this administration screen.

TABLE E-7. Trunk Group Screen Settings — Generic 1

FIELD	SETTING	REMARKS
Group Number		This field displays the ISDN-PRI trunk group number.
Group Type	isdn-pri	
Group Name		Enter a name one to fifteen characters in length that uniquely identifies this trunk group.
TAC		Enter the access code for this trunk group. This is needed for SMDR reports.
Direction	two-way	
Dial Access	n	Although dial access codes are supported for ISDN-PRI trunks, they are not recommended. Furthermore, they are not supported on System 85. All calls should be made through AAR, UDP, or ARS.
Service Type		Either tie or tandem should be assigned here. Tandem should be assigned if you want TCMs sent. Use tie if you do not want TCMs sent.
Far End Test No		Assign the number on this System 85 R2V4 to which maintenance test calls will be made to test the ISDN-PRI link. This number must be the real number of far-end test board because test calls to this number do not undergo any routing, such as through Ten-Digit-To-Seven Digit Conversion or Subnet Trunking. There are two extensions on the SN261B on a System 85 R2V4 that can be called for testing purposes. One extension is for analog testing and one is for digital testing. These extensions must be administered on System 85 R2V4. The analogous System 85 R2V4 administration is in procedure 108, word 1.
Send Display/TCM In Codeset 6/7	7	When connected to a System 85 R2V4, the display and TCM IEs must be sent in codeset 7. For connections to Generic 2, this will change to the default, codeset 6.

TABLE E-7 *(continued).* Trunk Group Screen Settings — Generic 1

FIELD	SETTING	REMARKS
Max Message Size To Send	128	128 bytes is the largest message a System 85 R2V4 can receive.
Connected to Toll?	no	This is a private network arrangement without connection to a toll office.
Send SID?	Y	Assign a y here if you want the calling party's station number and/or connected party's number sent to a System 85 R2V4 on the far end. The analogous System 85 R2V4 administration is in procedure 100, word 3, field 8.
Send Name?	Y	Assign a y here if you want the calling party name and/or connected party name to be sent to the far-end System 85 R2V4. The analogous System 85 R2V4 administration is in procedure 100, word 3, field 8.
Group Member Assignments		A trunk group member is an individual trunk associated with a single port on the TN767. Refer to the Port Assignments Record to assign individual trunks to this trunk group. Enter the port location in the Port field. Enter the trunk group member's name in the Name field. The name can be up to ten-characters. A good practice to follow here is to use the circuit identification from the local exchange as the member name. If you have problems in the T1 pipe, having this identification will allow the T1 facility providers to troubleshoot the circuit faster.

The TRUNK GROUP screen fields in table E-8, *Trunk Group Screen Settings - Page 2 - Incoming Call Handling Table — Generic 1,* comprise an incoming call handling table. The table consists of up to 12 rows of seven columns per row. The first three columns constitute a key that together select which row or unique treatment should apply for an incoming call on the group. The remaining four columns specify the treatment to be provided for a call that matches the key.

The first column or field of the key is the `Service/Feature` field. If an incoming call is for a service listed in a row in the incoming call handling table (see table E-8), then that row may specify the treatment for the call, depending on the other two columns of the key. The `Called Len` field is used to continue the row determination. If the number of digits received with the incoming call match the number of digits in the `Called Len` field for calls to the matched service, then this row may apply. If no other row also contains a matching service and called length, then this row does apply. If another row exists with the same service and number length, then the `Called Number` field is used to continue the row determination. If the leading digits received with the incoming call match the digits specified in the `Called Number` field, then this row applies to the call. Therefore, with this table, a unique treatment can be given to any incoming call, even if these calls are to the same service or have the same length of digits. The remaining four fields specify the unique treatment for the call once the row is determined. Together, the `Del` and `Insert` fields are used to manipulate the incoming number that routes the call. The `Per Call SID/ANI` field can be used to request SID/ANI only for specific calls incoming on the group. The `Night Serv` field is used to have calls of different types routed to different night destinations when night service is in effect.

This table is generally used when a Generic 1 is connected to the public network with several different services (such as MEGACOM® 800 service and ACCUNET® Switched Digital Services) but also has private network applications.

NOTE: Administering this table is optional.

TABLE E-8. Trunk Group Screen Settings - Page 2 - Incoming Call Handling Table — Generic 1

FIELD	SETTING	REMARKS
`Service/Feature`	`Tandem`	This field must match the `Service Type` field on the first page of the TRUNK GROUP screen. For connections to a System 85 R2V4, this field should be `tandem` if TCMs are sent or `tie` if TCMs are not sent.
`Called Len`		Enter the number of incoming digits expected. If the service type is tandem, 7 or 10 digits are expected.
`Called Number`		This field allows you to specify the leading digits on incoming calls that you want to match.
`Del`		Enter the number of leading digits you want deleted. This field combined with the next field allows you to treat calls that match the leading digits in special ways. These fields are analogous to the `DID Additional Digit` and `AAR/ARS Prefix Digit` fields in procedures 101 and 103 in System 85 R2V4.
`Insert`		Enter the digits to be inserted in this field.
`Per Call SID/ANI`		This field only applies to ISDN-PRI connections to the public network. Leave it blank.
`Night Serv.`		Enter an extension to which you want calls routed after hours. This field allows you to specify different night service destinations for different rows (types of calls) in the table.

Dial Plan Screens Settings

You must set up a dial plan that allows you to originate or tandem calls to and to receive calls from a System 85 R2V4. Since many ways exist to do this, this appendix does not cover the details of how to set up the dial plan. For consistency and troubleshooting purposes, the dial plan implementation on the Generic 1 should match that of the System 85 R2V4. For example, if a System 85 R2V4 uses AAR-only with a 4-digit dial plan, then so should the Generic 1.

Routing Patter Screen Settings

This screen is used to build the routing patterns for ISDN-PRI calls made to a System 85 R2V4. The patterns are selected using the HNPA, FNPA, RHNPA, and RNX tables. The only ISDN-PRI-specific fields in this screen are the `IXC`, `BCC value`, and `Service/Feature` fields. The BCC value fields can be used to route calls based on their ISDN BCs and low-layer compatibilities, such as voice versus mode 1 digital data. The subnet trunking feature is also present in this screen in the `No. Del Digits` and `Inserted Digits` fields.

Following is an example of this screen when a Generic 1 is connected to a System 85 R2V4 via ISDN-PRI tie trunks:

```
                                 Pattern Number: 2

      Grp.   FRL NPA Prefix Toll No. Del Inserted                          IXC
      No.            Mark   List Digits  Digits
   1: 92      1  619
   2: 93      1  619
   3: 94      1  619
   4: 95      1  619
   5:
   6:

      BCC  VALUE  Service/Feature
      0 1 2 3 4
   1 : y n y n n
   2 : n y n n n
   3 : n n y n n
   4 : n n n y n
   5 : n n n n n
   6 : n n n n n
```

Figure E-12. ROUTING PATTERN Screen

The allowed BCC values and a description of these values are:

- 0 Voice or voice-grade data
- 1 Mode 1 data
- 2 Mode 2 data
- 3 Mode 3 data
- 4 Mode 0 data

Table E-9, *Routing Pattern Screen Settings — Generic 1*, describes the ISDN-PRI-specific settings for this administration screen. For information on how to set the other fields, see *DEFINITY® 75/85 Communications System, Generic 1.1 and System 75 Implementation,* Issue 1, February 1989, 555-204-654, page 4-20 *(Routing Patterns).*

TABLE E-9. Routing Pattern Screen Settings — Generic 1

FIELD	SETTING	REMARKS
IXC		Leave this field blank for this application. 101288 is the interexchange (long distance) carrier code for AT&T. Since this is a private network, this field does not apply.
BCC Value		This is where Generalized Route Selection (GRS) is implemented. If you want only certain types of calls to be routed to specific trunk groups, enter a y for those types of calls in the desired preference. Enter n for those types of calls you do not want routed over that trunk group. For example, if you want only mode 0 calls (64K-bps raw data) routed only on the trunk group in the second preference, you would enter a y in the second preference under BCC value 4 and n for every other field in the BCC 4 column. If another type of call tries to go out over that trunk group, it will skip to the next preference. For further details of how to route calls using GRS, see the *Bearer Capability* section in chapter 1, *Introduction.*
Service/Feature		Leave this field blank. It applies to network services such as MEGACOM® service or WATS. Since this is a private network, this field does not apply.

SID Prefix Table Screen Settings

This screen allows you to decide which extensions will be used to send calling party and/or connected number. This feature is called ISDN-PRI Call Identification in Generic 1 terminology. For more details, see *DEFINITY® 75/85 Communications System, Generic 1 and System 75 Feature Description,* Issue 5, February 1989, 555-200-201. Refer to the section titled *Integrated Services Digital Network Primary Rate Interface.* Also refer to *DEFINITY® 75/85 Communications System, Generic 1 and System 75 Implementation,* Issue 1, February 1989, 555-204-654. See page 4-57.

The TRUNK GROUP screen must also be administered to send call identification information.

Following is an example of typical settings for this screen when a Generic 1 is connected to a System 85 R2V4 via ISDN-PRI tie trunks:

```
                          SID PREFIX TABLE

   Ext  Ext    SID       Ext  Ext    SID       Ext  Ext    SID
   Len  Code   Prefix    Len  Code   Prefix    Len  Code   Prefix

    5   65    61948
    5   66    61949
    5   67    61949
    5   68    61949
```

Figure E-13. SID PREFIX TABLE Screen

TABLE E-10. SID Prefix Table Screen Settings — Generic 1

FIELD	SETTING	REMARKS
Ext Len		This field and the next constitute a key that determines which row of the table to apply to a call. Enter the number of extension digits in the dial plan. For example, if you are on a five digit dial plan, enter 5. You can also use this table if you have a mixed numbering plan.
Ext Code		This field allows groups of extensions to be administered. If 12 is entered here, for example, and 5 was administered in the first field, then all extensions of the form 12XXX will match this row. If 12 is administered here and 123 is also administered, then all numbers of the form 12XXX except for 123XX will match this row. For example, if you wanted all extensions of the form 12XXX except for 123XX to be sent with the SID prefix 30346 and the 123XX extensions to be sent with the SID prefix 30353, then you would administer both 12 and 123 in this field in two different rows.

TABLE E-10 *(continued).* SID Prefix Table Screen Settings — Generic 1

FIELD	SETTING	REMARKS
`SID Prefix`		Enter the digits you add to the extension code digits to form a 10-digit SID number. For example, in the sample screen shown above, if any extension of the form 65XXX places or answers a call, the number sent to a System 85 on the far end will be 619-486-5XXX. In the example, the other numbers that would be sent are 619-496-6XXX, 619-496-7XXX, 619-496-8XXX.

Terminating Extension Group Screen Settings

The only field on this screen applicable to ISDN-PRI is the `ISDN Caller Display` field. You must enter either `grp-name` or `mbr-name` to specify whether the TEG group name or member name is sent to the originating user when a member of a TEG answers.

Hunt Group Screen Settings

The only field on this screen applicable to ISDN-PRI is the `ISDN Caller Display` field. You must enter either `grp-name` or `mbr-name` to specify whether the hunt group name or member name is sent to the far end when a member of a hunt group answers.

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